DEEL 108 1965

TIJDSCHRIFT VOOR ENTOMOLOGIE

UITGEGEVEN DOOR

DE NEDERLANDSCHE ENTOMOLOGISCHE VEREENIGING

16

Aflevering	1	verscheen	16	april	1965
,,	2	,,	16	,,	1965
,,	3	,,	16	,,	1965
,,	4	,,	30	juli	1965
,,	5	,,	30	,,	1965
,,	6	,,	17	september	1965
,,	7	,,	17	,,	1965
,,	8	,,	17	,,	1965
,,	9	,,	17	,,	1965
,,	10	,,	30	december	1965
,,	11	,,	30	,,	1965
,,	12	,,	30	,,	1965

INHOUD VAN DEEL 108

DEEL 108 AFLEVERING 1 1965

TIJDSCHRIFT VOOR ENTOMOLOGIE

UITGEGEVEN DOOR

DE NEDERLANDSCHE ENTOMOLOGISCHE VEREENIGING

INHOUD:

Tijdschrift voor Entomologie, deel 108, afl. 1. Gepubliceerd 16-IV-1965

Nederlandsche Entomologische Vereeniging

Bestuur

Commissie van Redactie voor de Publicaties

Bestuur der Afdeling voor Toegepaste Entomologie

De contributie voor het lidmaatschap bedraagt f 15.—, voor student-leden f 2.50, per jaar. — Begunstigers betalen jaarlijks tenminste f 15.—.

De leden, behalve de student-leden, ontvangen gratis de *Entomologische Berichten* van 12 nummers per jaar, waarvan de prijs voor student-leden f 1.50 per jaar, voor niet-leden f 20.— per jaar en f 2.— per nummer bedraagt.

De leden kunnen zich voor f 10.— per jaar abonneren op het *Tijdschrift voor Entomologie;* hiervan bedraagt de prijs voor niet-leden f 35.— per jaar.

De eerder verschenen publicaties der Vereeniging zijn voor de leden tegen verminderde prijzen verkrijgbaar.

Tijdschrift voor Entomologie

Het *Tijdschrift voor Entomologie* wordt uitgegeven door de Nederlandsche Entomologische Vereeniging en is bestemd voor de publicatie van de resultaten van de studie der Entomologie van algemene en bijzondere aard. Het verschijnt in één deel van 300—400 bladzijden per jaar, bestaande uit enkele afleveringen. Bovendien worden monographieën handelende over bijzondere onderwerpen, met onregelmatige tussenpozen uitgegeven.

DIE GATTUNGEN DER PALAEARKTISCHEN TORTRICIDAE

III. ADDENDA UND CORRIGENDA

2. Teil*)

VON

NIKOLAUS S. OBRAZTSOV

Sea Cliff, New York, U.S.A.

(Mit Abbildungen 1—6 und 4 Tafeln)

Abstract

This paper is an up-to-date synopsis of the Palearctic genera and species of the tribe Cnephasiini. It includes a complete catalogue with notes on the morphology and critical comments on the taxonomy and nomenclature of separate systematic units, also additions and corrections with reference to an earlier paper by the same author (Obraztsov, 1954—1957). Three genera of Cnephasiini (*Pternozyga* Meyrick, *Terthreutis* Meyrick, and *Epicnephasia* Danilevsky), omitted in that paper, are discussed in the present paper. A new genus *Kawabeia* is established for two species: *K. ignavana* (= *Cheimatophila* i. Christoph; type-species) and *K. razowskii* (= *Tortricodes* r. Kawabe). The genus *Pseudargyrotoza* Obraztsov has been transferred from Archipini to *Cnephasiini*, and *Palpocrinia* Kennel removed from the latter tribe to Eucosmini. New binominal combinations are established for seven species; the taxonomic status has been changed in two cases. Five names are treated as new synonyms. The definitions of *Cnephasia distinctana* Lucas and *C. fragosana* (Zeller) are corrected in accordance with the results of the examination of the type-specimens of these two species.

1. NACHTRAG UND BERICHTIGUNGEN ZUR UNTERFAMILIE TORTRICINAE

Wie dies bereits im 1.Teil der vorliegenden Addenda und Corrigenda erwähnt wurde, sind einzelne Teile meiner Revision der palaearktischen Tortricidae-Gattungen etwas rückständig geworden, was hauptsächlich durch die ununterbrochene Tätigkeit meiner zahlreichen, sich mit dem Studium der genannten Familie befassenden Kollegen und meine eigenen Untersuchungen zu erklären ist. Deshalb erscheint eine Vervollständigung und Berichtigung der bereits publizierten Angaben eine Notwendigkeit, und als erster Beitrag bringe ich nachstehend eine zeitgemäße Uebersicht der Tribus Cnephasiini, deren Studium in den letzteren Jahren besonders stark fortgeschritten ist. Dieser Nachtrag gründet sich auf die

*) Mit Unterstützung der *U.S. National Science Foundation* zur Publikation vorbereitet.

in der Literatur neulich erschienenen Beschreibungen und sonstigen Angaben, sowie meine eigenen Studien. Er bringt auch die kritischen Bemerkungen über verschiedene Probleme der Cnephasiini-Systematik. Im nachstehend folgenden Text beziehen sich alle bei den systematischen Einheiten angeführten Seitenangaben auf die durchgehende (eingeklammerte) Pagination der I. Abteilung meiner Revision ("Allgemeine Aufteilung der Familie und die Unterfamilien Tortricinae und Sparganothinae") wie diese in der *Tijdschrift voor Entomologie*, Bände 97—100, veröffentlicht wurde.

Ich halte es für die angenehme Pflicht, allen meinen Kollegen meinen herzlichen Dank auszusprechen, die diesen Nachtrag durch die Zusendung der entsprechenden Materialien und der Literatur und die brieflichen Mitteilungen zum Leben gerufen haben. Insbesondere bin ich dankbar Herrn J. D. BRADLEY (British Museum, London), Dr. W. FORSTER (Zoologische Sammlung des Bayerischen Staates, München), Dr. E. JÄCKH (Uebersee Museum, Bremen) und Dr. J. RAZOWSKI (Zoologisches Institut der Polnischen Akademie der Wissenschaften, Kraków). Die sprachliche Verbesserung des Textes dieser Publikation verdanke ich Herrn J. K. OJA (Sea Cliff, N.Y.).

TRIBUS CNEPHASIINI
(Seiten 93—124, 175—193, 233—240)

Gattung **Olindia** Gn., 1845 (Seiten 98, 175)

Nachtrag: *Pyralis* (part.) FABRICIUS, 1787, Mant. Ins., vol. 2, p. 236; *Phalaena Tortrix* (part.) GMELIN, 1788, Syst. Nat., ed. 13, vol. 1, p. 2507.

O. schumacherana (F.) (Seite 175; als *ulmana*)
Nachtrag: SWATSCHEK, 1958, p. 66, fig. 67 (Larvalmorphologie; als *ulmana*); RAZOWSKI, 1959, p. 199, t. 17 fig. 1, t. 36 fig. 165, t. 54 fig. 249 (Falter, ♂♀-Genitalien); HANNEMANN, 1961, p. 34, fig. 50—50b, t. 3 fig. 7 (Falter, Kopf, Geäder, ♂-Genitalien).

Leider ist das Gesetz, welches die eingebürgerten, obwohl präokkupierten Namen schützt, mit Anfangswirkungsdatum 1961 limitiert (International Code, 1961, Artikel 23, b). Deshalb kann der Name *schumacherana* Fabricius, der von WOLFF (1952) für die gewöhnlich als *ulmana* Hübner bekannte Art wiederaufgestellt wurde, nicht bestreitet werden.

ab. **cruciana** Burm. (Seite 175).
Nachtrag: RAZOWSKI, 1959, p. 199.
ab. **obscurana** Burm. (Seite 175).
Nachtrag: RAZOWSKI, 1959, p. 199.

Gattung **Isotrias** Meyr., 1895 (Seiten 101, 175)

Nachtrag: *Cnephasia* (part.) CURTIS, 1826, Brit. Ent., expl. t. 100.

I. rectifasciana (Hw.) (Seite 175)
Nachtrag: RAZOWSKI, 1959, p. 201, t. 17 fig. 3, t. 36 fig. 166, t. 44 fig. 250 (Falter, ♂♀-Genitalien); HANNEMANN, 1961, p. 34, fig. 51, 51a, t. 2 fig. 7 (Falter, Geäder,

♂-Genitalien). — Polen.
ab. **pseudomodestana** Obr. (Seite 176)
Nachtrag: *pseudomontana* RAZOWSKI, 1959, Acta Zool. Cracov., vol. 4, p. 201 (*Isotrias*).
ssp. **insubrica** M.-R. (Seite 176)
Nachtrag: RAZOWSKI, 1959, p. 202.
ssp. **castiliana** Rag. (Seite 176)
Nachtrag: *castillana* RAZOWSKI, 1959, Acta Zool. Cracov., vol. 4, p. 202 (*Isotrias*).

I. **hybridana** (Hb.) (Seite 176)
Nachtrag: RAZOWSKI, 1959, p. 203, t. 20 fig. 30, t. 36 fig. 167, t. 54 fig. 251 (Falter, ♂ ♀-Genitalien); HANNEMANN, 1961, p. 34, fig. 52, t. 3 fig. 11 (Falter, ♂-Genitalien). — Polen.
ssp. **pedemontana** Stgr. (Seite 176)
Nachtrag: RAZOWSKI, 1959, p. 204.

I. **joannisana** (Trti.) (Seite 176)
Nachtrag: RAZOWSKI, 1959, p. 205; 1961, p. 663, t. 86 fig. 2 (♂-Genitalien).

I. **stramentana** (Gn.) (Seite 176)
Nachtrag: RAZOWSKI, 1959, p. 204, t. 23 fig. 54, t. 36 fig. 168, t. 54 fig. 252 (Falter, ♂ ♀-Genitalien).
I. (?) **buckwelli** (Lucas) comb. nova
buckwelli LUCAS, 1954, Bull. Soc. Sci. Nat. Maroc, vol. 34, p. 39 (*Anisotaenia*). — Marokko.

Gattung **Propiromorpha** Obr., 1955 (Seiten 102, 176)

Die in diese Gattung eingereihte *adulterinana* Kenn. erwies sich als zu *Cnephasia* Curt. gehörig. Deshalb ist *Propiromorpha* als eine monotypische Gattung zu betrachten.

P. **rhodophana** (HS.) (Seite 176)
Nachtrag: *rodophana* (err.) RAZOWSKI, Acta Zool. Cracov., vol. 4, p. 208 (*Penthina*). — RAZOWSKI, 1959, p. 209, t. 18 fig. 9, t. 36 fig. 170, t. 55 fig. 254 (Falter, ♂ ♀-Genitalien).

Gattung **Eulia** Hb., 1825 (Seiten 103, 177)

Von den Arten, die in diese Gattung eingereiht wurden, erwies sich *abdallah* Le Cerf eine Aberration der *Paraclepsis accinctana* (Chrét.) zu sein (RAZOWSKI, 1961, p. 662); *neftana* Lucas gehört zu den Phaloniidae (RAZOWSKI, 1961b, p. 535). Die Arten *ancillana* Kenn. und *dryonephela* Meyr. blieben ununtersucht.

Eu. **ministrana** (L.) (Seite 177)
Nachtrag: RAZOWSKI, 1959, p. 207, t. 26 fig. 78, t. 36 fig. 169, t. 55 fig. 253 (Falter, ♂ ♀-Genitalien); SWATSCHEK, 1958, p. 66 (Larvalmorphologie); HANNEMANN, 1961, p. 35, fig. 53—53b, t. 2 fig. 10 (Falter, Kopf, Geäder, ♂-Genitalien).
ab. **dilutiana** Strand (Seite 177; als *dilutana*)
Berichtigung: *dilutiana* STRAND, 1902, Nyt. Mag. Naturvid., vol. 40, p. 173 (*Eulia*); *dilutana*, *-us* OBRAZTSOV, 1956, Tijdschr. v. Ent., vol. 99, p. 177 (*Eulia*; *Lophoderus*).
ab. **subfasciana** Stph. (Seite 177)
Nachtrag: RAZOWSKI, 1959, p. 208.

Gattung **Pseudargyrotoza** Obr., 1955 (Seiten 89, 173)

Diese Gattung wurde auf Grund der Untersuchung einer einzigen Art, *P. conwagana* (F.), aufgestellt und die weiteren vier Arten, nur wegen ihrer äußeren Aehnlichkeit mit *conwagana*, wurden zu *Pseudargyrotoza* eingereiht. Ein näheres Studium zweier von diesen Arten (*aeratana* Kenn. und *diticinctana* Wlsm.) hat doch gezeigt, daß ihre Einreihung richtig war. Dies gibt uns jetzt die Möglichkeit, die Charakteristik der Gattung zu vervollständigen. Valva länglich, distal etwas schmäler und abgerundet oder etwas stumpf angeschnitten: Sacculus verschiedenartig lang, rundstabförmig, mit einer halbfreien, mehr oder weniger abgerundeten Spitze. Uncus mittellang, leicht gebogen, länglich spatel- oder lanzettförmig. Fultura superior vollständig, bogenförmig oder in der Mitte winkelartig zugespitzt. Caulis entspringt von der Mitte des Aedoeagus oder leicht distal von dieser und ist mäßig lang oder sogar ziemlich kurz. Aedoeagus leicht gewellt, mit einem sehr langen Coecum penis, in der äußeren Hälfte fein bedornt oder ganz ohne Skulptur. Im übrigen sind die männlichen Genitalien wie in der Originalbeschreibung der Gattung. Beim Weibchen ist der Ductus bursae mehr oder weniger deutlich abgesondert, oder er bildet ein Ganzes mit dem Corpus bursae.

Larvalmorphologisch gesehen, nimmt die Gattung *Pseudargyrotoza* nach SWATSCHEK (1958) eine ganz abgesonderte Stellung unter den Tortricinae ein und zeigt eine gewisse Aehnlichkeit mit den Phaloniidae. Die Raupe hat einrangige Hakenkränze der Bauchfüße und am 7. Abdominalsegment besteht die Gruppe VII aus einer Borste. Meiner Ansicht nach handelt es sich hier nur um sekundäre Modifikationen, die im Zusammenhang mit der Lebensweise der in den Früchten lebenden Raupen steht. Nach MacKAY (1959) sind bei den Tortriciden, die als Bohrer leben, die deutlich zwei- oder dreirangigen Hakenkränze niemals beobachtet. Diese Autorin gibt noch an, daß bei manchen Cnephasiini-Raupen die Borstenzahl der Gruppe VII, sogar am 7. Abdominalsegment, unbeständig sei (MacKAY, 1962). Auch SWATSCHEK (1958) erwähnt, daß bei *Cnephasia longana* (Hw.) die Hakenkränze einrangig sind und in der „*wahlbomiana*"-Gruppe die Gruppe VII zuweilen aus einer Borste besteht.

Aus morphologischen Gründen ist es richtiger, *Pseudargyrotoza* als eine Cnephasiini-Gattung zu behandeln. Dafür sprechen die folgenden Merkmale: der stabförmige Sacculus, eine verhältnismäßig kurze Caulis, das Fehlen der Cornuti, die Reduktion der Lamella antevaginalis und das als ein undeutlicher Fleck entwickelte Signum.

P. conwagana (F.) (Seite 173)
Nachtrag: SWATSCHEK, 1958, p. 58, fig. 58 (Larvalmorphologie); HANNEMANN, 1961, p. 32, fig. 49—49b, t. 2 fig. 1 (Falter, Kopf, Geäder, ♂-Genitalien).

P. aeratana (Kenn.) (Seite 174)
Nachtrag: Diese Arbeit, Abb. 4 (♂-Genitalien).

P. diticinctana (Wlsm.) (Seite 174)
Nachtrag: ISSIKI, 1957, p. 82, t. 14 fig. 437 (Falter); diese Arbeit, Abb. 5, 6 (♂-Genitalien).

P. (?) leucophracta (Meyr.) (Seite 174).

P. (?) sumptuosana (Car.) (Seite 174).

Gattung Pternozyga Meyr., 1908

Typus generis (monot.): *Pternozyga haeretica* Meyr., 1908.
Capua (part.) WALSINGHAM, 1900, Ann. & Mag. Nat. Hist., ser. 7, vol. 5, p. 484.
Pternozyga MEYRICK, 1908, J. Bombay Nat. Hist. Soc., vol. 18, p. 621.
Epagoge (part.) DIAKONOFF, 1941, Treubia, vol. 18, p. 410.
Pternoryga (err.) VIETTE, 1952, Bull. Soc. Ent. France, vol. 57, p. 149.
Pternozya (err.) OKANO, 1959, Iconogr. Ins. Japon., vol. 1, Index, p. 40.

Kopf (DIAKONOFF, 1939, fig. 11, O; CLARKE, 1958, t. 102, fig. 1b) rauh beschuppt, Stirn mit nach vorne gerichteten Schuppen. Fühler leicht sägezähnig, bewimpert; beim Weibchen einfach, kürzer bewimpert; Basalglied durch Schuppen am Apex leicht verdickt. Labialpalpen etwa zweimal so lang wie der Kopf; 2.Glied lang, rauh beschuppt, in der Mitte leicht durch abstehende Schuppen verdickt; Terminalglied länglich, apikal gerundet, etwas kürzer als die Hälfte des 2. Gliedes. Saugrüssel kurz. Brust mit einem mäßigen Hinterschopf.

Vorderflügel (DIAKONOFF, 1939, fig. 11, N; CLARKE, 1958, t. 102, fig. 1a) breit, etwa dreieckig, ohne Costalumschlag beim Männchen; Costa gebogen; Apex zugespitzt, leicht hervortretend; Termen unter diesem eingezogen, dann gebaucht; Tornus abgerundet; Dorsum fast gerade distal, leicht gebaucht basal. 12 Adern; S leicht wellig; R_1 entspringt kurz nach der Mitte der Mittelzelle; R_2 fast doppelt so nahe zu R_3 als zu R_1, von beiden weit entfernt; R_3 stark zu R_4 genähert; R_4 und R_5 gestielt, R_4 führt in die Costa, R_5 in den Saum; M_2 an der Basis zu M_3 genähert; M_3 und Cu_1 entspringen dicht beisammen vom unteren Winkel der Mittelzelle, dann verlaufen sie parallel und voneinander entfernt; Cu_2 entspringt im letzten Drittel der Mittelzelle; A_1 meistens nur tornal entwickelt; Basalgabel A_{2+3} etwa ein Fünftel so lang wie die ganze Ader.

Hinterflügel (DIAKONOFF, 1939, fig. 11, N; CLARKE, 1958, t. 102 fig. 1a) abgerundet trapezförmig, schmäler oder fast so breit wie die Vorderflügel; Costa ganz sanft gebogen; Apex ganz unbedeutend zugespitzt, kaum hervortretend; Termen flach eingezogen; Tornus breit abgerundet; Dorsum stark und gleichmäßig gebogen. 8 Adern; S ganz sanft wellig, fast gerade; R und M_1 entspringen ganz dicht beisammen, oder aus einem Punkt, oder sie sind gestielt; M_2 basal etwa zweimal so nahe zu M_3 wie am Termen; M_3 und Cu_1 entspringen ganz dicht beisammen oder aus einem Punkt am unteren Winkel der Mittelzelle; Cu_2 entspringt etwa von der Mitte der Mittelzelle; A_1 weich; A_2 basal gabelig, stark zu A_3 genähert. Cubitus unbehaart.

Männliche Genitalien (Abb. 1, 2). Tegumen breit; Pedunculi sehr breit dorsal, gleichmäßig verjüngt ventral; Saccus breit, leicht zugespitzt. Valva in der Basalhälfte breit, in der Außenhälfte etwa halb so breit, deutlich aufgebogen und am Apex abgerundet; Sacculus umschlagartig, der inneren Valvenfläche dicht anliegend, bis zur Mitte der Valva reichend und an der Außenspitze abgerundet; Pulvinus und Processus basalis fehlen. Uncus schmal, stemmeisenförmig, am Apex leicht konkav; Gnathos mit einer langen Mittelspitze; Socii weich, mäßig lang, distal erweitert, an der Basis an den Tegumenschultern befestigt. Fultura superior bandartig, ausgebogen. Keine echte Caulis; Aedoeagus mäßig lang flach ∽-förmig

gebogen, mittels des Unterrandes des Sinus penis mit einer hohen und basal viel breiteren Fultura inferior verbunden; keine Cornuti.

Weibliche Genitalien (Abb. 3; DIAKONOFF, 1939, fig. 15, G; CLARKE, 1958, t. 102 fig. 1c, d). Papillae anales eigenartig gebaut, von außen stark eingebogen, distal etwa rektangulär, proximal stark an den Seiten gebaucht. Apophyses anteriores and posteriores etwa gleich lang. Sterigma mehr oder weniger sklerotisiert, bei der palaearktischen *minuta* kaum unterscheidbar; Seiten und Proximalrand des Sinus vaginalis schmal umrandet und stärker sklerotisiert; Antrum ziemlich lang, leicht sklerotisiert. Ductus bursae gleich breit wie das Antrum oder breiter und länger; Corpus bursae membranös; kein Signum.

Diese Gattung zählt nur fünf Arten, von welchen nur eine (*minuta* Wlsm.) in der palaearktischen Region vorkommt, die übrigen vier (*argodoxa* Meyr., *anisoptera* Diak., *haeretica* Meyr. und *melanoterma* Diak.) sind der orientalischen Region und dem Papua-Gebiet eigen. *Pternozyga* ist der *Protopterna* Meyr. nahe verwandt; die letztere hat auch eine ähnliche Verbreitung und zeichnet sich in erster Linie durch die voneinander getrennten Vorderflügeladern R_4 und R_5 und anders gebauten Labialpalpen aus.

P. minuta (Wlsm.) (Seite 170)

Berichtigung: *pusillana* Wkr., *probolias* Meyr. und *exalbescens* Meyr. sind als Synonyme dieser Art zu streichen. Nachtrag: *pusillana* (part.) DIAKONOFF, 1941, Treubia, vol. 18, p. 410 (*Epagoge*); *minutana* (err.) ISSIKI, 1957, Icones Heter. Japon. Color. Nat., vol. [1], p. 84, t. 14 fig. 448 (Falter) (*Pternozyga*). — OKANO, 1959, p. 267, t. 178 fig. 6 (Falter); diese Arbeit, Abb. 1—3 (♂ ♀-Genitalien). — Japan.

Gattung **Terthreutis** Meyr., 1918

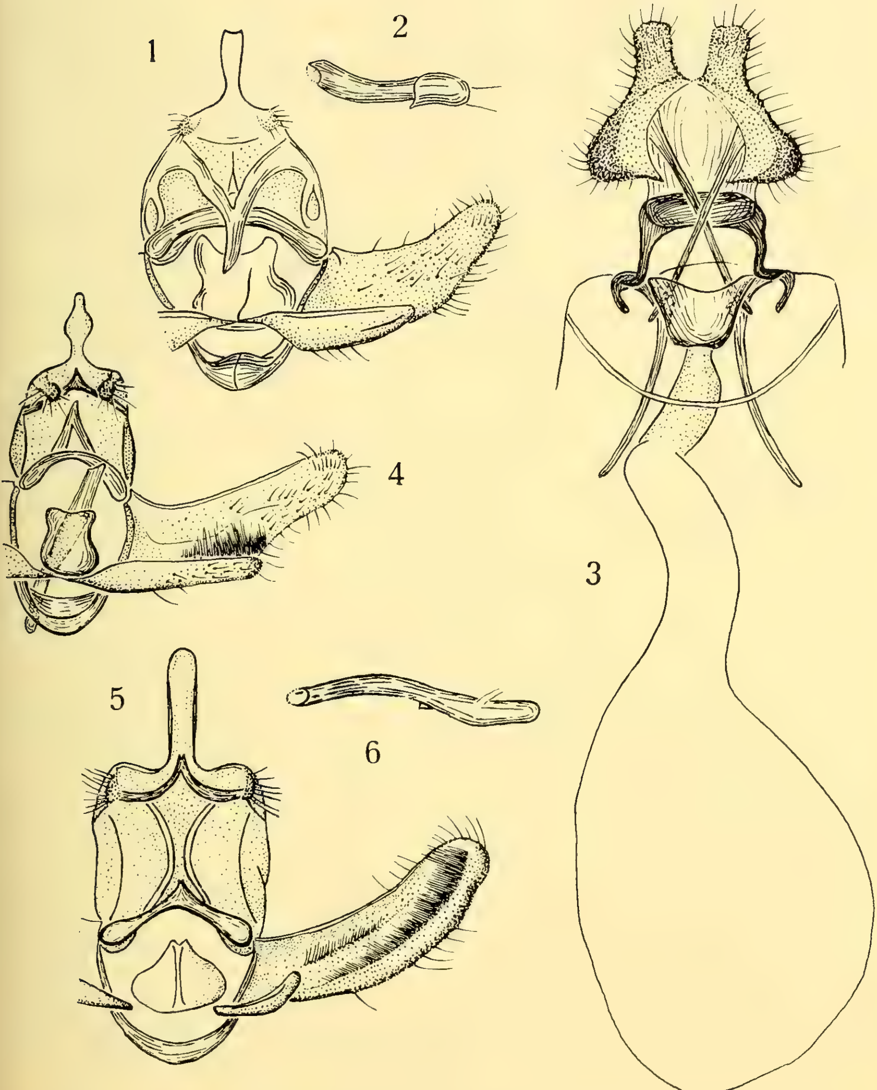
Typus generis (monot.): *Terthreutis sphaerocosma* Meyr., 1918.

Terthreutis MEYRICK, 1918, Exot. Micr., vol. 2, p. 170.

Amniodes MEYRICK, 1938, Iris, vol. 52, p. 13, Typus generis: *Amniodes xanthocycla* Meyr., 1918.

Kopf (DIAKONOFF, 1939, fig. 8, P; CLARKE, 1958, t. 12 fig. 1b, t. 115 fig. 1b) rauh beschuppt, Stirn mit mehr anliegenden Schuppen. Fühler mehr oder weniger lang büschelartig bewimpert; die des Weibchens kurz behaart; Scapus kurz, basal durch glatte Beschuppung verdickt. Labialpalpen mäßig lang, schlank, aufgebogen; Basalglied am Apex durch anliegende Schuppen erweitert; 2. Glied leicht gebogen, dünn und ziemlich glatt beschuppt; Terminalglied glatt, kurz bis mäßig lang, zugespitzt. Saugrüssel kurz bis mäßig lang. Brust mit einem schwachen Hinterschopf.

Vorderflügel (DIAKONOFF, 1939, fig. 8, O; CLARKE, 1958, t. 12 fig. 1a, t. 115 fig. 1a) unregelmäßig oval, etwa zweieinhalbmal so lang wie breit, beim Männchen ohne Costalumschlag; Costa in der Basalhälfte gebogen, weiter fast gerade; Apex breit abgerundet; Termen schräg, gerade oder vor dem Tornus leicht eingezogen; Tornus ziemlich flach abgerundet; Dorsum distal sanft, basal stärker gebogen. 12 Adern; S mehr oder weniger flachwellig bis fast gleichmäßig gebogen; R_1 entspringt von der Mitte oder kurz vor der Mitte der Mittelzelle; R_2 etwa zweimal so nahe zu R_3 wie zu R_1; R_3 bedeutend näher zu R_4 als zu R_2; R_4 und R_5 entspringen dicht beisammen oder aus einem Punkt, oder sie sind ganz kurz gestielt; R_4 führt in die Costa, R_5 in den Apex oder in den oberen Teil des Termen: M_2, M_3 und Cu_1 an der Basis fast gleich weit auseinander gestellt, aber



Cnephasiini-Arten. Abb. 1: *Pternozyga minuta* (Wlsm.), männliche Genitalien (Präparat No. 6324; Japan, 1886, Pryer; 70114, B.M.). Abb. 2: Idem, Aedoeagus. Abb. 3: Idem, weibliche Genitalien (Präparat No. 6305; Tomakomai, Japan, 26. Juni 1919; B.M.). Abb. 4: *Pseudargyrotoza aeratana* (Kenn.), männliche Genitalien (Präparat No. 5686; Japan, Issiki leg.; B.M.). Abb. 5: *Pseudargyrotoza diticinctana* (Wlsm.), männliche Genitalien (Präparat No. 5694; Japan, 1886, Pryer; Paratypus, 70438, B.M.). Abb. 6: Idem, Aedoeagus

in ihrem weiteren Verlauf weiter voneinander entfernt; Cu_1 entspringt am Unterwinkel der Mittelzelle; Cu_2 entspringt vom letzten Drittel der Mittelzelle; A_1 nur tornal entwickelt oder ganz weich; Basalgabel A_{2+3} etwa ein Viertel so lang wie die ganze Ader, oder etwas länger.

Hinterflügel (DIAKONOFF, 1939, fig. 8, O; CLARKE, 1958, t. 12 fig. 1a, t. 115 fig. 1a) so breit wie die Vorderflügel oder etwas breiter; Costa etwas bücklig an der Mitte; Apex abgerundet; Termen gleichmäßig abgerundet oder unter dem Apex leicht eingezogen; Tornus und der äußere Teil des Dorsums bilden eine gemeinsame, stark gebogene Kurve. 8 Adern; S wellig oder zuweilen fast gerade; R und M_1 gestielt; M_2 weit von M_3 entfernt und ihr fast parallel; M_3 und Cu_1 entspringen aus einem Punkt am unteren Winkel der Mittelzelle, oder sie sind kurz gestielt; Cu_2 entspringt zwischen der Mitte und dem letzten Viertel der Mittelzelle; A_1 mehr oder weniger deutlich; A_2 an der Basis kurz gabelig; A_3 ihr nahe. Cubitus unbehaart.

Männliche Genitalien (DIAKONOFF, 1939, fig. 12, G; CLARKE, 1958, t. 12 fig. 1c, 1d, t. 115 fig. 1c, 1d). Tegumen sehr breit und verhältnismäßig kurz, sphärisch; Pedunculi sehr breit; Saccus klein, bogenförmig. Valva mäßig breit, ausgezogen, fast gerade oder leicht aufgebogen, am Apex und Außenrand abgerundet; Costa ganz schmal sklerotisiert, hauptsächlich in der Basalhälfte; Sacculus schmal, distal verwischt. Uncus mäßig lang, stark gebogen, basal breiter; Gnathos mit starken, ziemlich kurzen, distal erweiterten Lateralarmen und einem verdickten, oben abgerundeten, unten ein- oder zweispitzigen Mittelvorsprung; Socii mäßig lang, hängend. Fultura superior vollständig, mehr oder weniger sklerotisiert, lateral erweitert; Fultura inferior subrhombisch, membranös. Caulis nur als eine leichte Verdickung des unteren Randes des Sinus penis angedeutet. Aedoeagus schlank, gebogen; Coecum penis kurz.

Weibliche Genitalien (DIAKONOFF, 1939, fig. 14, A; CLARKE, 1958, t. 115 fig. 2a, 2b). Papillae anales breit, etwa eiförmig. Lamella antevaginalis mäßig breit, halbkreisförmig, mit je einem, distal stärker sklerotisierten Lateralflügel. Kein abgesondertes Antrum; Ductus bursae von Cervix bursae nicht abgetrennt; Ductus seminalis mündet in den proximalen Drittel des Ductus bursae. Corpus bursae rundlich, membranös; Signum schwach sklerotisiert, rund, plattenförmig, nahe bei der Cervix bursae liegend.

Diese Gattung steht der *Cnephasia* Curt. ziemlich nahe, aber unterscheidet sich von ihr in äußeren Strukturen, sowie auch durch die Einzelheiten des Genitalbaues. Die geographische Verbreitung beschränkt sich auf die orientalische Region und von drei bekannten *Terthreutis*-Arten reicht nur *xanthocycla* Meyr. bis zu den Grenzen der Palaearktik (Yünnan). Die zwei übrigen Arten, *bulligera* Meyr. und *sphaerocosma* Meyr., sind aus Indien, Burma und Formosa bekannt.

T. xanthocycla Meyr.

xanthocycla MEYRICK, 1938, Iris, vol. 52, p. 13 (*Amniodes*). — CLARKE, 1958, p. 24, t. 12 fig. 1—1d (Falter, Kopf, Geäder, ♂-Genitalien). — Yünnan (Likiang).

Gattung **Cnephasia** Curt., 1826 (Seiten 104, 177)

Nachtrag: *Lobesia* (part.) LEDERER, 1859, Wien. Ent. Mschr., vol. 3, p. 328.

Nicht bei allen Arten sitzt der Aedoeagus unmittelbar auf der Fultura inferior.

Sogar bei den verhältnismäßig wenigen Arten, bei welchen dies der Fall ist, verbindet sich der Aedoeagus mit der Fultura inferior mittels einer kleinen, schuppenartigen Fortsetzung des Ventralrandes des Sinus penis. Bei den meisten Arten befindet sich zwischen dem Aedoeagus und der Fultura inferior ein mehr oder weniger langes Sklerit, welches eine ganz regelmäßige Caulis bildet. In der Art, nach welcher diese Verbindung verwirklicht wird, wollte RAZOWSKI (1959) die Rechtfertigung einer subgenerischen Aufteilung der *Cnephasia*-Arten sehen und meinte, daß den Arten ohne eine Chitinrandleiste am Sacculus auch eine einfache Verbindung des Aedoeagus mit der Fultura inferior eigen sei. Die Arten mit einer wohl entwickelten Randleiste seien dagegen durch das Vorhandensein einer mehr oder weniger entwickelten Caulis charakterisiert. Dementsprechend schlug RAZOWSKI vor, diese beiden Gruppen als zwei Untergattungen, *Anoplocnephasia* Réal und *Cnephasia* s. str., zu unterscheiden. Ohne jede eingehende Erläuterung schrieb dieser Autor weiter: „The structure of transtilla in *Anoplocnephasia* Réal differs somewhat from that of *Cnephasia* Curt. s. str." Zur Charakteristik der erst genannten „Untergattung" gab er noch zu: „Gnathos thin and lacking the terminal plate, rarely with a small such plate". Eine Nachprüfung aller dieser Merkmale zeigt doch, daß die nach dem Sacculus-Bau zu *Anoplocnephasia* gehörigen Arten wie *divisana* Raz., *grandis* Osth. und *minutula* Falk. eine Caulis wie die meisten Arten der Gruppe *Cnephasia* s. str. haben. Die Endplatte des Gnathos ist nicht nur in der Gruppe *Anoplocnephasia,* sondern auch bei manchen Arten der Gruppe *Cnephasia* s. str. ziemlich klein, so daß auch dieses Merkmal von keinem subgenerischen Wert ist. Von Art zu Art weist auch die Fultura superior („Transtilla") keine beständige Regelmäßigkeit auf. Die weiblichen Genitalien beider Gruppen weisen überhaupt keine Gruppenunterschiede auf. Dementsprechend gibt es keine genügende Beweise zur Rechtfertigung einer subgenerischen Aufteilung der Gattung *Cnephasia.* Anscheinend hat auch RAZOWSKI auf seinen Vorschlag dieser Aufteilung verzichtet, da er bei seinen neulichen *Cnephasia*-Artbeschreibungen keine Untergattungen mehr erwähnt.

Ueber die Larvalmorphologie der Gattung *Cnephasia* war längere Zeit fast gar nichts bekannt. Die neuzeitlichen Studien in dieser Richtung erwiesen sich auch für die taxonomischen Zwecke als sehr wichtig. MacKAY (1962) betont, daß larvalmorphologisch *Cnephasia* und die ihr nahe verwandte *Cnephasiella* Adamcz. eine Reihe gemeinsamer Eigentümlichkeiten in der Chaetotaxie des 9.Abdominalsegments aufweisen, die solchen der Phaloniidae gewissermaßen ähnlich erscheinen. Gleichzeitig treten doch bei diesen beiden Cnephasiini-Gattungen noch manche andere Merkmale auf, die eine höhere Entwicklungsstufe aufdecken. Die *Cnephasia*-Raupen haben einen deutlich ausgebildeten Analkamm (was auch von SWATSCHEK, 1958, bestätigt wird), der mit der Lebensweise dieser zwischen den versponnenen Blättern, Trieben und Blüten lebenden Raupen gut übereinstimmt.

In den letzten Jahren sind unsere Kenntnisse über die *Cnephasia*-Arten stark fortgeschritten, dank hauptsächlich den erfolgreichen Studien von Herrn J. RAZOWSKI. Der nachstehende Katalog (mit Bezugnahme auf die Seiten 177—185 des vorher veröffentlichten) bringt eine neue Zusammenstellung aller bekannt gewordenen Arten, deren systematische Reihenfolge vorläufig nur ganz provisorisch sein kann. Dieser Zusammenstellung gemäß, sind die folgenden Arten als Syno-

nyme zu betrachten: *pulmonariana* Réal, 1953 = *cinareana* Chrétien, 1892; *terebrana* Amsel & Hering, 1931 = *lineata* Walsingham, 1900 (die letztere wurde als eine *Doloploca*-Art aufgestellt und in dieser Gattung auch in meinem Kataloge beibehalten); *uniformana* Caradja, 1916 = *chrysantheana* Duponchel, 1843. Die als gute Arten aufgestellten *orthoxyana* Réal und *apenninicola* Obraztsov sind, die erstere als ein Synonym der *cupressivorana* Staudinger, die andere als ihre Unterart aufgefaßt. Dagegen sind die als Formen der *pumicana* Zeller angeführten *bizensis* Réal und *graecana* Rebel als eigene Arten aufzufassen. Die letztere ist mit *adulterinana* Kennel konspezifisch, die von *Propiromorpha* Obr. zu *Cnephasia* zu stellen ist. Zu *Eana* Billb. gehören die vorher als *Cnephasia*-Arten aufgefaßten *vetulana* Christoph und die irrtümlicherweise als eine Form der *chrysantheana* behandelte *freii* Weber. Von den früher in andere Gattungen gestellten Arten kommen jetzt zu *Cnephasia* die folgenden: *amseli* Lucas aus *Aphelia* Hb. und *tyrrhenica* Amsel aus *Eana* Billb. Die letztere Art ist mit *ecullyana* Réal konspezifisch. Von den vorher als „Species incertae sedis" angeführten *Cnephasia*-Arten erwiesen sich *alhamana* Schmidt als zu *Epagoge* Hb. gehörig, *distinctana* Lucas eine eigene, mit *fragosana* Zeller bisweilen verwechselte *Cnephasia*-Art zu sein und *luctuosana* Rebel als zu *Zelotherses* Ld. zu stellen. *Sciaphila mesomelana* Walker ist überhaupt keine Tortriciden-Art; nach ihrem Holotypus im British Museum (Weibchen ohne Hinterleib, Schanghai, China) zu urteilen, gehört sie zweifellos zu den Phaloniidae und kann als *Hysterosia* (*Propira*) *mesomelana* (Walker) COMB. NOVA bezeichnet werden. Die Gesamtzahl der gegenwärtig als *Cnephasia* Curt. bekannten palaearktischen Arten ist 75; von diesen sind acht Arten ganz wenig untersucht und können vorläufig nur als „Species incertae sedis" bezeichnet werden. Mein voriger Katalog zählte 51 Arten.

C. **sedana** (Const.) (Seite 177)
Nachträge: *mediterranea* RÉAL, 1953, Bull. Mens. Soc. Linn. Lyon, vol. 22, p. 61 (*Cnephasia, Anoplocnephasia*; nom. nud.). — RAZOWSKI, 1958a, p. 566; 1959, p. 258, t. 24 fig. 61, 62, t. 45 fig. 211, t. 60 fig. 282 (Falter, ♂ ♀-Genitalien); 1961b, p. 534 (*mediterranea*); HANNEMANN, 1961, p. 38, fig. 60 (♂-Genitalien; Aedoeagus falsch), t. 2 fig. 20 (Falter).

Die von RAZOWSKI (1957b, p. 101, fig. 2, 3) als *C. sedana amseli* Raz. aus Iran aufgestellte Unterart unterscheidet sich nach der Valvenform stark von allen mir als *sedana* bekannten Exemplaren. Ob es hier nur um die Präparationstechnik handelt oder ob die Falter aus Iran einer neuen Art angehören, kann man ohne eine eingehende Untersuchung nicht sagen. Beim Weibchen sind die Lamella postvaginalis, das Antrum und die Länge des Signum von solchen der *sedana* auch unterschieden. Die erwähnte Form hat keinen gültigen Namen, da der von RAZOWSKI veröffentlichte durch *C. amseli* (Lucas, 1952) präokkupiert wird.

f. (?ab.) **valderiana** Trti. & Vrty. (Seite 177)
Nachtrag: RAZOWSKI, 1959, p. 259; 1961b, p. 529 (als *meridionalis*).
ab. **rhactivana** Raz.
rhactivana (HS. in litt.) RAZOWSKI, 1959, Acta Zool. Cracov., vol. 4, p. 259 (*Cnephasia*).
f. (?ab.) **agathana** Kenn. (Seite 177)
Nachtrag: RAZOWSKI, 1958a, p. 566, t. 53 fig. 4 (Falter).

Vielleicht ist diese letztere Form in Juldus wirklich lokal beständig und könnte dort als eine Unterart, wie dies RAZOWSKI (1958a) meint, bezeichnet werden. In den Serien von Dscharkent und aus dem Kaukasus fand ich sie immer nur als einen Bestandteil der gemischten, aus verschiedenen Formen gebildeten Populationen.

ssp. alaicana Car. (Seite 178)

C. stachi Raz.
stachi RAZOWSKI, 1958, Acta Zool. Cracov., vol. 2, p. 567, t. 53 fig. 5, t. 57 fig. 29, t. 60 fig. 46 (Falter, ♂♀-Genitalien) (*Cnephasia, Anoplocnephasia*). — Samarkand.

C. heinemanni Obr. (Seite 178)
Nachtrag: RAZOWSKI, 1959, p. 257, t. 24 fig. 59, t. 45 fig. 212, t. 60 fig. 283 (Falter, ♂♀-Genitalien).

C. clarkei Raz.
sedana (part.) FILIPJEV, 1934, Bull. Acad. Sci. URSS, p. 1408 (*Cnephasia*); *oricasis* (non Meyr.) RAZOWSKI, 1957, Beitr. naturk. Forsch. Südwestdeutschl., vol. 16, p. 104 (*Cnephasia*); *clarkei* RAZOWSKI, 1961, Acta Zool. Cracov., vol. 5, p. 667, t. 86 fig. 4 (♂-Genitalien) (*Cnephasia*). — OBRAZTSOV, 1957, p. 324 (unter *oricasis*); CLARKE, 1958, p. 88, t. 44 fig. 2—2b (Falter, ♂-Genitalien; als *oricasis*). — Kaschmir.

C. minima Raz.
minima RAZOWSKI, 1959, Acta Zool. Cracov., vol. 4, p. 258, t. 24 fig. 60, t. 45 fig. 210 (Falter, ♂-Genitalien) (*Cnephasia, Anoplocnephasia*). — Herzegowina.

C. lineata (Wlsm.) (Seiten 178, als *terebrana* und 192)
lineata WALSINGHAM, 1900, Ann. & Mag. Nat. Hist., ser. 7, vol. 5, p. 462 (*Doloploca*); *terebrana* AMSEL & HERING, 1931, Dtsche Ent. Zschr., p. 148 (*Tortrix*). — STAUDINGER & REBEL, 1901, p. 93, No. 1634; AMSEL, 1935, p. 290, t. 11 fig. 86 (Falter); 1935a, p. 260 (♂-Genitalien; in beiden Arbeiten als *terebrana*); RAZOWSKI, 1961, p. 667, t. 86 fig. 3 (♂-Genitalien); FILIPJEV, 1962, fig. 19b (Gnathos; als *terebrana*); diese Arbeit, Taf. 2 fig. 3, 4 (Falter, ♂-Genitalien). — Palästina.

RAZOWSKI (1961) als erster stellte die Synonymie der *lineata* und *terebrana* fest. Der Holotypus der *lineata* ist ein Männchen (Genitalpräparat No. 5667) von Palästina (TRISTRAM; 13511) und befindet sich im British Museum. Außer dem Holotypus habe ich noch einen männlichen Paratypus (Genitalpräparat No. 6163; Palästina, TRISTRAM; 13513; B.M.) untersucht. Leider lag mir kein Weibchen vor.

C. ussurica Fil.
ussurica FILIPJEV, 1962, Trudy Zool. Inst. Akad. Nauk SSSR, vol. 30, p. 379, fig. 17—19a (Falter, ♂-Genitalien) (*Cnephasia*). — Südussuri (Sutschan).

C. minutula Falk.
minutula FALKOVITSH, 1962, Trudy Inst. Zool. Akad. Nauk Kazachsk. SSR, vol. 18, p. 98, fig. 3, 4 (♂♀-Genitalien) (*Cnephasia*). — Südkasakstan.

C. grandis (Osth.) (Seite 178)
Nachtrag: Diese Arbeit, Taf. 2 Fig. 5, 6 (♂-Genitalien).

C. orientana (Alph.) (Seite 178)
Nachtrag: RAZOWSKI, 1958a, p. 567, t. 53 fig. 6, t. 57 fig. 30, t. 60 fig. 47; 1959, p.

260, t. 24 fig. 63, 64, t. 45 fig. 213, t. 46 fig. 284 (in beiden Arbeiten: Falter, ♂ ♀-Genitalien).
ssp. (?) **maraschana** Car. (Seite 178)
Nachtrag: Palästina.

C. **margelanensis** Raz.
margelanensis RAZOWSKI, 1958, Acta Zool. Cracov., vol. 2, p. 565, t. 53 fig. 1, t. 60 fig. 45 (Falter, ♂-Genitalien) (*Cnephasia, Anoplocnephasia*). — Uzbekistan.

Solange keine Männchen bekannt sind, ist die Einreihung der *margelanensis* am Ende der Artgruppe ohne eine Randleiste am Sacculus als rein provisorisch zu betrachten.

C. **divisana** Raz.
divisana RAZOWSKI, 1959, Zschr. Wien. Ent. Ges., vol. 44, p. 82, fig. 2, t. 2 fig. 2 (Falter, ♂-Genitalien) (*Cnephasia*). — Kreta.

C. **tristrami** (Wlsm.) (Seite 178)
Nachtrag: Diese Arbeit, Taf. 1 Fig. 1—3 (Falter, ♂ ♀-Genitalien).

WALSINGHAM (1900) stellte diese Art auf Grund der vier Exemplare auf, von welchen ich nur zwei, als „Typen" bezeichneten Weibchen untersuchen konnte. Eins davon (Genitalpräparat No. 5669; „Palestine, TRISTRAM"; 13507) war falsch als ein Männchen bestimmt und als solches auch bei der Urbeschreibung erwähnt; das andere (Genitalpräparat No. 5668; „Palestine, TRISTRAM"; 13508) hatte eine richtige Geschlechtbezeichnung und ist an dieser Stelle als Lectotypus der *tristrami* gewählt. Die beiden Typen befinden sich im British Museum. Ich halte ein Stück, das Dr. E. JÄCKH (Bremen) mir freundlicherweise als *Cnephasia tristrami* mitteilte, für das Männchen dieser Art. Diese Art steht der *C. facetana* Kenn. nahe und unterscheidet sich von dieser durch eine kürzere, obwohl ebenso rudimentäre Randleiste am Sacculus.

C. **facetana** Kenn. (Seite 178)
Nachtrag: RAZOWSKI, 1958a, p. 566, t. 53 fig. 2 (Männchen).

Die Genitalien des Typus von *facetana* sind verloren gegangen. N. FILIPJEV, der sie seinerzeits untersuchte, schrieb auf dem Zettel: „*tristrami* Wlsgh., N. Fil." (RAZOWSKI, 1958a). Leider gibt es jetzt keine Möglichkeit diese Synonymie nachzuprüfen, da der *tristrami*-Typus (s. oben) ein Weibchen ist. Nur ein größeres Material von beiden Geschlechtern der *facetana* und *tristrami*, das noch nicht vorliegt, könnte das Problem vielleicht klären. Vorläufig fasse ich als *facetana* die Art auf, deren männlichen Genitalien ich bei einem Stück aus Mesopotamien untersuchte und veröffentlichte (OBRAZTSOV, 1950, p. 313, fig. 9b).

C. **tofina** Meyr. (Seite 179)
Nachtrag: CLARKE, 1958, p. 88, t. 4 fig. 4—4b (Falter, ♂-Genitalien).

Bei dieser Art ist der Sacculus wohl nur in seinem Distalteil entwickelt, wo er mit einer stark chitinisierten, nach unten gerichteten Spitze endet. Die basalen drei Viertel der Randleiste sind kaum angedeutet.

C. **longana** (Hw.) (Seite 179)
Nachtrag: RAZOWSKI, 1957, p. 127, t. 17 fig. 2, t. 21 fig. 6, t. 25 fig. 4, 5; 1958, p. 77, t. 1 fig. 4, t. 2 fig. 12, t. 5 fig. 21, 22; 1959, p. 246, t. 22 fig. 43—48, t. 43 fig. 200—202, t. 59 fig. 274 (in allen drei Arbeiten: Falter, ♂♀-Genitalien); 1961b, p. 532 (als *minor*); SWATSCHEK, 1958, p. 61, fig. 61 (Larvalmorphologie); HANNEMANN, 1961, p. 38, fig. 59, t. 6 fig. 21 (Falter, ♂-Genitalien); MacKAY, 1962, p. 24, fig. 25 (Larvalmorphologie). — Polen.
ab. **ictericana** Hw. (Seite 179)
Nachtrag: RĄZOWSKI, 1959, p. 247.
f. **cadizensis** Raz.
cadizensis RAZOWSKI, 1959, Acta Zool. Cracov., vol. 4, p. 248, t. 43 fig. 201 (♂-Genitalien) (*Cnephasia*). — Spanien (Cadiz).

Die männlichen Genitalien dieser Form sind leicht modifiziert, aber die Unterschiede der namenstypischen Form gegenüber scheinen nicht groß genug zu sein um hier eine eigene Art zu vermuten. Das Weibchen ist unbekannt.

C. **nuraghana** Ams. (Seite 179)
Nachtrag: RAZOWSKI, 1958, p. 80, t. 1 fig. 7, t. 7 fig. 27 (Falter, ♂-Genitalien); 1959, p. 252, t. 23 fig. 55, t. 44 fig. 205 (dasselbe).

C. **klimeschi** Raz.
klimeschi RAZOWSKI, 1958, Polsk. Pismo Ent., vol. 27, p. 79, t. 2 fig. 13, t. 6 fig. 24 (*Cnephasia, Brachycnephasia*). — RAZOWSKI, 1959, p. 250, t. 23 fig. 49, t. 59 fig. 276 (in beiden Arbeiten: Falter, ♀-Genitalien). — Mazedonien.

C. **gueneana** (Dup.) (Seite 179)
Nachtrag: RAZOWSKI, 1958, p. 79, t. 1 fig. 6, t. 2 fig. 14, t. 6 fig. 25, t. 7 fig. 26; 1959, p. 251, t. 23 fig. 52—54, t. 44 fig. 204, t. 59 fig. 278 (in beiden Arbeiten: Falter, ♂♀-Genitalien). — Malta; Cypern.
ab. **segetana** Z. (Seite 179)
Nachtrag: RAZOWSKI, 1959, p. 251, 252.

Die als eine eigene Art beschriebene *taurominana* Raz. soll nach der Angabe ihres Autors der *gueneana* sehr ähnlich aussehen. Wie ich mich bereits an einer anderen Stelle äußerte (OBRAZTSOV, 1957, p. 321), sind auch die Genitalunterschiede beider zu gering um eine artliche Selbständigkeit der *taurominana* zu rechtfertigen. Im Vergleich zu *gueneana* beschreibt RAZOWSKI (1955) den Ductus bursae der *taurominana* als „lang und merklich deutlicher chitinisiert". Als einen weiteren Unterschied gibt er die verschiedene Länge der Apophyses anteriores und posteriores und wiederholt dies auch in seinen späteren Arbeiten (RAZOWSKI, 1958, p. 80, t. 3 fig. 15, t. 8 fig. 28; 1959, p. 250, t. 23 fig. 51, t. 59 fig. 277). Von allen drei veröffentlichten Genitalabbildungen der *taurominana* ist die die Originalbeschreibung begleitende anscheinend die richtigste, da sie die kleinsten Einzelheiten wiedergibt. Aus dieser Abbildung ist zu ersehen, daß der als „Ductus bursae" bezeichnete Teil ziemlich tief in die Bursa copulatiix geht und bis zum Signum reicht. Es ist deshalb sehr wahrscheinlich, daß es sich hier nicht un einen echten Ductus bursae handelt, sondern vermutlich um ein abgebrochenes Collum spermatophori. Die angeblich verschiedene Länge der Apophyses anteriores und posteriores bei *gueneana* und *taurominana* kann nicht als ein Artunterschied bewertet werden, da diese Länge bei *gueneana* ziemlich stark individuell variiert. Solange keine weiteren Exemplare der *taurominana* vorliegen und die Aufstellung dieser Art sich nur auf ein ein-

ziges Weibchen gründet, wäre es am besten, *taurominana* als ein Synonym der *gueneana* aufzufassen.

C. amseli (Luc.) (Seite 158)
Nachtrag: RAZOWSKI, 1961, p. 663, t. 90 fig. 19 (♀-Genitalien); 1961b, p. 535.

Diese in meinem Katalog bedingungsweise zu *Aphelia* Hb. gestellte Art erwies sich als zu *Cnephasia* gehörig (RAZOWSKI, 1961). Solange die männlichen Genitalien der *amseli* nicht untersucht sind, ist die systematische Stellung dieser Art nahe bei *gueneana* nur als rein provisorisch zu betrachten.

C. laetana (Stgr.) (Seite 180)
Nachtrag: RAZOWSKI, 1959, p. 225, t. 20 fig. 25, 26, t. 38 fig. 177, t. 57 fig. 263 (Falter, ♂ ♀-Genitalien); 1959a, p. 82.

C. fulturata Rbl. (Seite 181)
Nachtrag: *fulturana* RAZOWSKI, 1959, Acta Zool. Cracov., vol. 4, p. 218 (*Cnephasia*). — RAZOWSKI, 1959a, p. 83, fig. 3 (♂-Genitalien; als *fulturana*).

C. bizensis Réal (Seite 179)
pumicana (non Z.) KENNEL, 1910, Pal. Tortr., p. 212, fig. 21 (♂-Genitalien) (*Tortrix*); *bizensis* Réal, 1953, Bull. Mens. Soc. Linn. Lyon, vol. 22, p. 58 (*Cnephasia, Brachycnephasia*). — RAZOWSKI, 1956, t. 4 fig. 5, t. 5 fig. 10 (Falter, ♂-Genitalien; als *pumicana*); 1958, p. 77, t. 1 fig. 3, t. 2 fig. 11, t. 5 fig. 20 (Falter, ♂ ♀-Genitalien); 1959, p. 249, t. 23 fig. 50, t. 43 fig. 203, t. 59 fig. 275 (dasselbe); 1961b, p. 532. — Frankreich; Spanien; Kleinasien.

Diese als eine *pumicana*-Unterart aufgestellte Art wurde auch in meinem Katalog zu *C. pumicana* (Z.) gerechnet.

C. kenneli Obr. (Seite 184)
Nachtrag: RAZOWSKI, 1958, p. 80, t. 1 fig. 8, t. 8 fig. 29; 1958a, p. 573, t. 15 fig. 15, t. 58 fig. 36 (Falter, ♂-Genitalien).

C. heringi Raz.
heringi RAZOWSKI, 1958, Acta Zool. Cracov., vol. 2, p. 575, t. 55 fig. 19, 20, t. 58 fig. 38, t. 62 fig. 58 (*Cnephasia*). — RAZOWSKI, 1959, p. 244, t. 21 fig. 38, t. 42 fig. 196, t. 58 fig. 272 (in beiden Arbeiten: Falter, ♂ ♀-Genitalien); 1959a, p. 82. — Kleinasien; Kreta.

C. parnassicola Raz.
parnassicola RAZOWSKI, 1958, Acta Zool. Cracov., vol. 2, p. 581, t. 56 fig. 25, t. 59 fig. 43, t. 62 fig. 59 (*Cnephasia*). — RAZOWSKI, 1959, p. 225, t. 19 fig. 24, t. 38 fig. 179, t. 57 fig. 262 (in beiden Arbeiten: Falter, ♂ ♀-Genitalien). — Griechenland; Spanien.

C. tremewani Raz.
tremewani RAZOWSKI, 1961, Polsk. Pismo Ent., vol. 31, p. 107, fig. 3 (♀-Genitalien) (*Cnephasia*). — Algerien (Oran).

C. pumicana (Z.) (Seite 179)
Berichtigung: KENNEL, 1910, p. 212, t. 11 fig. 2 (nicht Textfigur 21!).
Nachtrag: RAZOWSKI, 1956, t. 4 fig. 5, t. 5 fig. 10 (Falter, ♂-Genitalien); 1958, p. 76, t. 1 fig. 1, 2, t. 2 fig. 9, t. 4 fig. 17, 18; 1959, p. 245, t. 21 fig. 39, 40, t. 42 fig. 197, 198, t. 59 fig. 273 (in beiden Arbeiten: Falter, ♂ ♀-Genitalien). — Dalmatien; Italien; Sizilien; Spanien; Tripolitanien; Tunis; Westkleinasien.
ssp. hagiosana Raz.
hagiosana RAZOWSKI, 1959, Zschr. Wien. Ent. Ges., vol. 44, p. 82, t. 2 fig. 3 (Falter) (*Cnephasia*). — Cypern.

Die in meinem Kataloge als *pumicana*-Unterarten angeführten *bizensis* Réal und *graecana* Rbl. erwiesen sich, die erstere als eine gute Art (s. oben), die zweite als ein Synonym der *C. adulterinana* (Kenn.) (s. unten).

C. tripolitana Raz.
tripolitana RAZOWSKI, 1958, Polsk. Pismo Ent., vol. 27, p. 76, t. 2 fig. 10, t. 4 fig. 19 (Falter, ♀-Genitalien) (*Cnephasia, Brachycnephasia*). — Tripolitanien.

C. fiorii Raz.
fiorii RAZOWSKI, 1958, Polsk. Pismo Ent., vol. 27, p. 81, t. 3 fig. 16, t. 8 fig. 30 (Falter, ♀-Genitalien) (*Cnephasia*). — Tripolitanien.

Die beiden obigen Arten wurden als der *C. pumicana* (Z.) ähnlich beschrieben. Solange ihre männlichen Genitalien ununtersucht bleiben, ist ihre Einreihung bei *pumicana* nur als provisorisch zu betrachten.

C. distinctana Luc. (Seite 184)
Nachtrag: *fragosana* (non Z.) RAZOWSKI, 1959, Acta Zool. Cracov., vol. 4, p. 253, t. 23 fig. 56, t. 44 fig. 206, t. 60 fig. 279 (Falter, ♂♀-Genitalien) (*Cnephasia*). — RAZOWSKI, 1961, p. 666; 1961b, p. 535 (als *fragosana*). — Südfrankreich; Sizilien; Griechenland; Kleinasien; Nordwestafrika.

Diese Art verwechselte RAZOWSKI (1959, 1961) mit *C. fragosana* (Z.), deren Typus er nicht untersuchte.

C. semibrunneata (Joann.) (Seite 178; als mit *fragosana* synonymisch angeführt)
Berichtigung und Nachtrag: *semibrunneata* JOANNIS, 1891, Bull. Soc. Ent. France, p. 81 (*Sciaphila*); *semibruneata* REBEL, 1901, Stgr.-Rbl. Cat. Lep. Pal. Faun., vol. 2, p. 91, No. 1609b (*Cnephasia*); *orientana* (part.) KENNEL, 1910, Pal. Tortr., p. 203, t. 10 fig. 28 (*Tortrix*); *gueneana* (part.) MEYRICK, 1912, WAGNERS Lep. Cat., pars 10, p. 44 (*Cnephasia*); *fragosana* (part.) FILIPJEV, 1935, Zschr. Oesterr. Ent. Ver., vol. 20, p. 49 (*Cnephasia*). — KENNEL, 1910, p. 199, t. 10 fig. 29; RAZOWSKI, 1959, p. 254 (part.); 1961, p. 664, t. 91 fig. 20 (♀-Genitalien). — Nordwestafrika.

C. adulterinana (Kenn.) comb. nova (Seite 176)
adulterinana KENNEL, 1901, Iris, vol. 13, (1900), p. 221 (*Lophoderus*); SYNON. NOV.: *graecana* REBEL, 1902, Berl. Ent. Zschr., vol. 47, p. 105 (*Cnephasia*); *pumicana* (non Z.) GRAVES, 1925, The Ent., vol. 58, p. 293 (*Cnephasia*); *semibrunneata* (part.) RAZOWSKI, 1959, Acta Zool. Cracov., vol. 4, p. 254, t. 24 fig. 57, t. 44 fig. 207, t. 45 fig. 208, t. 60 fig. 280 (Falter, ♂♀-Genitalien) (*Cnephasia*); SYNON. NOV.: *ochreana* RAZOWSKI, 1961, ibid., vol. 5, p. 666 (*Cnephasia*). — STAUDINGER & REBEL, 1901, p. 260, No. 1559bis; KENNEL, 1910, p. 167, t. 8 fig. 51 (Falter); OBRAZTSOV, 1955, p. 157; 1956, p. 108, 111 (als *adulterinana* und *pumicana* ssp. *graecana*); RAZOWSKI, 1961, p. 666 (als *graecana*); diese Arbeit, Taf. 1 Fig. 4 (♀-Genitalien). — Jugoslawien; Griechenland; Kleinasien; Nordwestafrika.

Die Holotypus von *adulterinana* (Weibchen, Genitalpräparat No. 30-Obr., Teniet el Haad, Mauretania, V.d.B.; Z.M.B.), sowie ein weiteres Weibchen aus derselben Lokalität und in derselben Sammlung, stimmen ganz gut, auch genitaliter, mit der Art überein, die von RAZOWSKI (1959) zunächst als *semibrunneata* bestimmt und dann für *graecana* anerkannt wurde. Von *C. semibrunneata* (Joann.), die vorläufig nur im weiblichen Geschlechte bekannt ist, unterscheidet sich *adulterinana* in der Form der Lamella postvaginalis, deren caudale Auswüchse bedeutend kürzer als bei *semibrunneata* sind; die ganze Lamella postvaginalis ist bei

adulterinana weniger in der cephalocaudalen Richtung ausgedehnt und hat den Proximalrand dem distalen fast parallel.

C. virginana (Kenn.) (Seite 180).

Als „*Cnephasia virginiana* Kenn." wurden von Razowski (1957b, p. 104, fig. 5, 6) die Genitalien einer Art abgebildet und beschrieben, welche sich von der Kennelschen *virginana* stark unterscheiden. Möglicherweise gehören die von Razowski untersuchten Exemplare zu einer noch unbeschriebenen Art.

C. jozefi Raz.

jozefi Razowski, 1961, Polsk. Pismo Ent., vol. 31, p. 105, fig. 4 (♀-Genitalien) (*Cnephasia*). — Algerien (Oran).

C. fragosana (Z.) (Seite 178)

Berichtigung: *fragosana* Zeller, 1847, Isis, p. 673 (*Sciaphila*); *fragrosana* Herrich-Schäffer, 1851, Syst. Bearb. Schm. Eur., vol. 4, p. 199 (*Sciaphila*) [1850, Tortr., t. 54 fig. 379; non bin.]. — Kennel, 1910, p. 203 (als *fragrosana*); Filipjev, 1935, p. 49 (♂-Genitalien); diese Arbeit, Taf. 3 Fig. 1, 2 (Falter, ♂-Genitalien). — Sizilien.

Der Lectotypus der *fragosana* (Männchen, Genitalpräparat No. 5670, Syracus, Sizilien, 21. Mai; B.M.) unterscheidet sich stark von der Art, die unter diesem Namen von Razowski (1959, 1961) aufgefaßt wurde und die in der Tat *C. distinctana* Luc. ist (s. oben). Das Weibchen der *fragosana* ist vorläufig nicht bekannt und es ist durchaus möglich, daß Filipjev (1935) recht hatte, als er *C. semibrunneata* (Joann.) und *fragosana* synonymisierte. Da die Typen dieser beiden Arten aus weit voneinander getrennten Lokalitäten stammen, halte ich es für zweckmäßig, *fragosana* und *semibrunneata* vorläufig als zwei verschiedene Arten zu behandeln.

C. alfacarana Raz.

alfacarana Razowski, 1958, Acta Zool. Cracov., vol. 2, p. 578, t. 56 fig. 22, t. 58 fig. 40, t. 61 fig. 53 (*Cnephasia*). — Razowski, 1959, p. 220, t. 19 fig. 17, 18, t. 37 fig. 175, t. 56 fig. 259 (in beiden Arbeiten: Falter, ♂ ♀-Genitalien). — Spanien (Sierra de Alfacar).

C. atlantis Fil. (Seite 182)

Nachtrag: Razowski, 1956a, p. 207, fig. 8, 9, t. 20 fig. 5, 6 (Falter, ♂ ♀-Genitalien).

C. asiatica Kuzn.

asiatica Kuznetzov, 1956, Rev. Ent. URSS, vol. 35, p. 447, fig. 1, 2 (♂ ♀-Genitalien) (*Cnephasia*). — Kopetdag-Gebirge.

C. communana (HS.) (Seite 180)

Nachtrag: *mediocris* Réal, 1953, Bull. Mens. Soc. Linn. Lyon, vol. 22, p. 59 (*Cnephasia*); *seminigra* Réal, 1953, l.c. (*Cnephasia*); *pseudorthoxyana* Réal, 1953, l.c. (*Cnephasia*); *caprionica* Réal, 1953, l.c. (*Cnephasia*). — Razowski, 1957, p. 129, t. 19 fig. 2, t. 22 fig. 6, t. 26 fig. 6; 1959, p. 223, t. 19 fig. 21—23, t. 28 fig. 178, t. 56 fig. 261 (in beiden Arbeiten: Falter, ♂ ♀-Genitalien); 1959, p. 229 (als *virgaureana* ab. *mediocris*); 1961, p. 665; 1961b, p. 533; Hannemann, 1961, p. 40, fig. 63, t. 6 fig. 22 (Falter, ♂-Genitalien).

ab. lucia Réal (Seite 180)

Nachtrag: Razowski, 1961b, p. 533.

Die von Réal (1953) beschriebenen und in meinem Kataloge als eigene Aberrationen angeführten *pseudorthoxyana, caprionica* und *seminigra* gehören zur Synonymie der namenstypischen *communana*-Form (Razowski, 1961, 1961b).

C. chrysantheana (Dup.) (Seite 181; S. 184, als *uniformana*)
Nachtrag: *rectilinea* Réal, 1953, Bull. Mens. Soc. Linn. Lyon, vol. 22, p. 60 (*Cnephasia*); *directana* Réal, 1953, ibid., p. 60 (*Cnephasia*); *interjunctana* Réal, 1953, l.c. (*Cnephasia*); *peyerimhoffi* Réal, 1953, l.c. (*Cnephasia*); *pseudochrysantheana* Réal, 1953, l.c. (*Cnephasia*); *parvana* Réal, 1953, l.c. (*Cnephasia*); Synon. nov.: *uniformana* Caradja, 1916, Iris, vol. 30, p. 49 (*Cnephasia*). — Razowski, 1956, t. 3 fig. 3, t. 5 fig. 8 (Falter, ♀-Genitalien; als *wilkinsoni*); 1957, p. 128, t. 18 fig. 2, t. 22 fig. 3, t. 26 fig. 2 (als *wilkinsoni*); 1959, p. 236, t. 21 fig. 34, t. 40 fig. 187—189, t. 58 fig. 269 (in beiden letzteren Arbeiten: Falter, ♂♀-Genitalien); 1961, p. 665 (als *alternella*); 1961b, p. 530, 533, 534 (Synonymie); Hannemann, 1961, p. 35, fig. 54, t. 6 fig. 19 (Falter, ♂-Genitalien).
ab. **vulgaris** Réal (Seite 182)
Nachtrag: Razowski, 1961b, p. 534.
ab. **diffusana** Haud. (Seite 182)
Nachtrag: Razowski, 1959, p. 238.

Die bei dieser Aberration als ein Synonym angeführte *parvana* Réal gehört zur Synonymie der namenstypischen *chrysantheana*-Form, sowie auch die meisten anderen der von Réal (1953) beschriebenen Aberrationen.

ab. **siennicolor** Réal (Seite 182)
Nachtrag: Razowski, 1959, p. 238; 1961b, p. 533.

Nach einer brieflichen Mitteilung des Herrn J. Razowski gehört die als eine eigene Art aufgestellte *C. uniformana* Car. zur Synonymie von *chrysantheana*. Die von mir der *chrysantheana* als eine Aberration zugerechnete *freii* Web. erwies sich als zu *Eana* Billb. gehörig (Sauter, 1961).

Wie früher (Obraztsov, 1956, p. 113; 1957, p. 322) bestehe ich auch jetzt auf der Zweckmäßigkeit, den Namen *chrysantheana* in seinem eingebürgerten Sinne für die in Frage stehende Art zu erhalten. Das würde auch im Interesse der Nomenclaturstabilität wichtig sein. Aus diesem Grunde kann ich nicht Razowskis (1961) Vorschlag akzeptieren, den Namen *chrysantheana* Dup. auf die als *C. cinareana* Chrét. bekannte Art zu verlegen und die gewöhnlich als *C. chrysantheana* (Dup.) bekannte Art als *C. wilkinsoni* Réal oder *C. alternella* Stph. zu bezeichnen. Außerdem muß es notiert werden, daß der letztgenannte Name für *chrysantheana* unbrauchbar ist, da Stephens (1852, p. 65) nicht der Originalautor dieses Namens war. Er hat nämlich den Namen *Phalaena Tinea alternella* (Schiffermiller & Denis, 1776, p. 135) verwendet, ohne Rücksicht auf einen ähnlichen Gebrauch dieses Namens bei Treitschke (1832, p. 39) zu nehmen, der bereits 20 Jahre früher als Stephens die jetzt als *Tortricodes tortricella* (Hb.) bekannte Art als *Lemmatophila alternella* (Schiff.) bezeichnete.

C. stolidana (Wkr.) comb. nova
stolidana Walker, 1863, List Spec. Lep. Ins. B. M., pars 28, p. 346 (*Sciaphila*); ?*wahlbomiana* Issiki, 1922, Zool. Mag. (Tokyo), vol. 34, p. 285 (*Cnephasia*); ?*chrysantheana* (non Dup.) Yasuda, 1962, Publ. Ent. Lab. Univ. Osaka Pref., No. 7, p. 51, fig. 3 (1—12), t. 1 fig. 13 (Falter, ♂♀-Genitalien, Larvalmorphologie) (*Cnephasia*). — Diese Arbeit, Taf. 2 Fig. 1, 2 (Falter, ♀-Genitalien). — Ostchina (Schanghai); ?Japan.

Der Holotypus dieser Art ist ein Weibchen aus Schanghai (Genitalpräparat No. 5681) im British Museum. Wie äußerlich so auch genitaliter steht *stolidana* der

chrysantheana Dup. nahe, aber unterscheidet sich von der letzteren durch ein in der Mitte eingedrücktes Sterigma. Leider verfüge ich gegenwärtig nur über ein einziges, ganz schlechtes Foto der Genitalien, das dieses Merkmal undeutlich widergibt. Das Sterigma der *stolidana* steht dem der *cinereipalpana* näher als dem der *chrysantheana,* aber hat den Caudalrand seiner Laterallappen nicht konvex sondern eher etwas konkav. Außerdem sind bei *stolidana* die inneren Winkel dieser Lappen deutlich zugespitzt, während sie bei *cinereipalpana* breit abgerundet sind. Das Antrum ist bei *stolidana* viel schmäler als bei *chrysantheana* und hat keine deutlichen Colliculi. In dieser Richtung erinnert es an das Antrum der *cinereipalpana,* aber es ist etwas schmäler. Zur *stolidana* gehört anscheinend die von YASUDA (1962) als *chrysantheana* bestimmte Art, die nach seiner Mitteilung die einzige aus Japan bekannte *Cnephasia*-Art sei. Die männlichen Genitalien dieser Art erinnern an die der *chrysantheana*, aber die Sacculus-Spitze ist etwas anders gebaut und der ganze Sacculus ist merklich kürzer; außerdem hat der Aedoeagus einen ventralen Aufschlag kurz vor seiner Spitze. In dieser Beziehung ist der Aedoeagus der japanischen Art dem der *cinereipalpana* ähnlich, aber bei der letzteren befindet sich der Aufschlag auf der Dorsalseite des Aedoeagus, dessen ganze Form (sowie die Endplatte des Gnathos und der Sacculus) ganz anders aussieht. Die weiblichen Genitalien der japanischen Art sind denen der *stolidana* ziemlich ähnlich.

C. syriella Raz.
syriella RAZOWSKI, 1956, Acta Zool. Cracov., vol. 1, p. 21, t. 3 fig. 1, t. 5 fig. 6 (Falter, ♀-Genitalien) (*Cnephasia*). — RAZOWSKI, 1959a, p. 83. — Syrien; Kleinasien; Cypern.

C. hispanica Obr. (Seite 181)
Nachtrag: RAZOWSKI, 1959, p. 239, t. 40 fig. 190 (♂-Genitalien).

C. anatolica Obr. (Seite 182).

C. octomaculana Stph. (Seite 182)
Nachtrag: RAZOWSKI, 1959, p. 240, t. 21 fig. 35, t. 41 fig. 191, t. 58 fig. 270 (Falter, ♂ ♀-Genitalien).

C. cinereipalpana Raz.
cinereipalpana RAZOWSKI, 1958, Acta Zool. Cracov., vol. 2, p. 581, t. 56 fig. 27, 28, t. 59 fig. 44, t. 62 fig. 57 (Falter, ♂ ♀-Genitalien). — Südussuri (Wladiwostok).

C. kurentzovi Fil.
kurentzovi FILIPJEV, 1962, Trudy Zool. Inst. Akad. Nauk. SSSR, vol. 30, p. 380, fig. 20, 21 (Falter, ♂-Genitalien) (*Cnephasia*). — Südussuri (Sutschan).

Diese Art wurde nach zwei schlecht erhaltenen Exemplaren aufgestellt und ihre Originalbeschreibung enthält keine besonderen Merkmale, die *kurentzovi* von *C. cinereipalpana* Raz. deutlich trennen könnten. Die vorhandene Genitalabbildung ist ziemlich schematisch; außerdem ist sie in Seitenansicht dargestellt, wodurch kein Vergleich beider Arten möglich ist. Da die beiden Arten aus einander nahe liegenden Lokalitäten stammen, ist es nicht ausgeschlossen, daß sie artlich zusammen gehören. Nur ein Vergleich der Genitalpräparate könnte vielleicht das Problem lösen.

C. tolli Raz.
tolli RAZOWSKI, 1956, Acta Zool. Cracov., vol. 1, p. 22, t. 4 fig. 4, t. 5 fig. 9 (*Cnephasia*). — RAZOWSKI, 1959, p. 243, t. 21 fig. 37, t. 41 fig. 193, 194, t. 42 fig. 195 (in beiden Arbeiten: Falter, ♂-Genitalien). — Palästina; Cypern.
f. **palaestinensis** Ams.
palaestinensis AMSEL, 1958, Zschr. Wien. Ent. Ges., vol. 43, p. 71 (*Cnephasia*). — Palästina.

Bei der f. *palaestinensis* handelt es sich um ein einziges Männchen aus Abu Goasch bei Jerusalem, bei dem der Aedoeagus etwas länger und schmäler als bei *tolli* ist und keine Crista hat. J. RAZOWSKI, dem dieses Exemplar zusammen mit dem Genitalpräparat vorlag, bestimmte es als seine *tolli*, aber mit einem Fragezeichen. AMSEL (1958) beschrieb dieses Exemplar als eine Unterart von *tolli*. Sollte *palaestinensis* nur eine individuelle Modifikation dieser Art sein, dann bedürft sie keinen besonderen Namen; sonst wäre diese Form besser als eine eigene Art zu bezeichnen.

C. cupressivorana (Stgr.) (Seite 181; S. 180, als *orthoxyana*)
Nachtrag: *orthoxyana* RÉAL, 1951, Bull. Mens. Soc. Linn. Lyon, vol. 20, p. 224, fig. 1, 2 (♂♀-Genitalien) (*Cnephasia*); *reducta* RÉAL, 1951, ibid., p. 225 (*Cnephasia*); *confluentana* RÉAL, 1951, ibid., p. 225 (*Cnephasia*). — RAZOWSKI, 1956, p. 22, t. 3 fig. 2, t. 5 fig. 7 (Falter, ♂-Genitalien); 1958a, p. 580; 1959, p. 220, t. 19 fig. 19, 20, t. 37 fig. 176, t. 56 fig. 260 (Falter, ♂♀-Genitalien); p. 221 (*orthoxyana*); 1961, p. 664; 1961b, p. 528, 529 (Synonymie).
ab. **styx** Réal (Seite 180)
Nachtrag: *orthoxyana* (part.) RAZOWSKI, Acta Zool. Cracov., vol. 4, p. 221 (*Cnephasia*). — RAZOWSKI, 1961b, p. 529.
f. **apenninicola** Obr. (Seite 181; als selbständige Art)
Nachtrag: RAZOWSKI, 1959, p. 221. — Griechenland; Sardinien; „Austria" (?Dalmatien oder ?Istrien).

Die Formen *reducta* und *confluentana*, sowie *orthoxyana*, alle von RÉAL (1951) aufgestellt, gehören zur Synonymie der *cupressivorana* Stgr. (s. oben).

C. conspersana Dougl. (Seite 181)
Nachtrag: RAZOWSKI, 1959, p. 243, t. 21 fig. 36, t. 41 fig. 193, 194, t. 58 fig. 271 (Falter ♂♀-Genitalien). — Spanien.
ab. **albospersana** P. & M. (Seite 181)
Nachtrag: SYNON. NOV.: *albospersana* RAZOWSKI, 1959, Acta Zool. Cracov., vol. 4, p. 242 (*Cnephasia*).

C. tyrrhaenica Ams. (Seite 191; als *tyrrhaenica* und *ecullyana*)
Berichtigung und Nachtrag: *tyrrhaenica* AMSEL, 1951, Fragm. Ent., vol. 1, p. 108, fig. 8 (♂-Genitalien) (*Cnephasia*); *ecullyana* RÉAL, 1951, Bull. Mens. Soc. Linn. Lyon, vol. 20, p. 228, fig. 3, 4 (♂♀-Genitalien) (*Cnephasia, Hypostephanuncia*). — RAZOWSKI, 1958a, p. 570; 1959, p. 255, t. 24 fig. 58, t. 45 fig. 209, t. 60 fig. 281 (Falter, ♂♀-Genitalien); 1961b, p. 529. — Südfrankreich; Sardinien; Sizilien; Yugoslawien.

C. hellenica Obr. (Seite 184)
Nachtrag: RAZOWSKI, 1958, p. 78, t. 1 fig. 5, t. 6 fig. 23; 1958a, p. 572, t. 54 fig. 13, 14, t. 58 fig. 35; 1959, p. 246, t. 22 fig. 41, 42, t. 42 fig. 199 (in allen drei Arbeiten: Falter, ♂-Genitalien). — Spanien; Kleinasien.

C. bleszynskii Toll (Seite 183)
Nachtrag: RAZOWSKI, 1957, p. 129, t. 18 fig. 4, t. 26 fig. 4; 1959, p. 231, t. 20 fig. 31, t. 39 fig. 184 (in beiden Arbeiten: Falter, ♂-Genitalien); HANNEMANN, 1961, p. 38, fig. 58 (♂-Genitalien).

C. pascuana (Hb.) (Seite 183)
Berichtigung: In der Synonymie statt „*pascuana*" [HÜBNER, 1796—99 etc.] ZELLER, 1878 zu lesen: *pasiuana* etc.
Nachtrag: RAZOWSKI, 1957, p. 128, t. 18 fig. 3, t. 22 fig. 4, t. 26 fig. 3 (als *obsoletana*); 1959, p. 232, t. 20 fig. 32, t. 39 fig. 185, t. 57 fig. 267 (in beiden Arbeiten: Falter, ♂ ♀-Genitalien); 1961b, p. 529, HANNEMANN, 1961, p. 36, fig. 57, t. 2 fig. 17 (Falter, Geäder, Kopf, ♂-Genitalien).
ab. (?) **algerana** Réal (Seite 183)
Nachtrag: RAZOWSKI, 1961b, p. 534.
ab. **cleuana** Réal (Seite 183)
Nachtrag: RAZOWSKI, 1959, p. 233; 1961b, p. 529.
ab (?) **obscurana** (Seite 183)
ab. **pseudotypica** Réal
pseudotypica RÉAL, 1952, Rev. Franç. Lép., vol. 13, p. 220 (*Cnephasia*). — RAZOWSKI, 1959, p. 233.
f. (?) **pyrophagana** Rbl. (Seite 183)
f. (?) **linophagana** Rbl. (Seite 183)

C. sareptana Raz.
sareptana RAZOWSKI, 1959, Acta Zool. Cracov., vol. 4, p. 218, t. 18 fig. 15, t. 37 fig. 174 (Falter, ♂-Genitalien) (*Cnephasia*). — RAZOWSKI, 1961c, fig. 2 (♂-Genitalien). — Ostrussland (Sarepta).
ssp. **alatauana** Raz.
alatauana RAZOWSKI, 1961, Polsk. Pismo Ent., vol. 31, p. 105, fig. 1 (♂-Genitalien) (*Cnephasia*). — Alatau-Gebirge; Armenien (Erivan).

Anscheinend handelt es sich bei *alatauana* um eine eigene, von *C. sareptana* verschiedene Art. Es ist kaum wahrscheinlich, daß eine Unterart solch ein großes (oder zerrissenes) Areal haben könnte.

C. osthelderi Obr. (Seite 182)
Nachtrag: *constantinana* (part.) RAZOWSKI, 1958, Acta Zool. Cracov., vol. 2, p. 576, t. 15 fig. 21, t. 61 fig. 52 (Falter, ♀-Genitalien) (*Cnephasia*).

Neulich hat RAZOWSKI (1958a) auf Grund von fünf Exemplaren eine Art aufgestellt, die er *C. constantinana* nannte. Ein einziges ihm vorliegendes Männchen (Constantine, Algerien) hat er als Holotypus bezeichnet; als Allotypus wählte er ein Weibchen von Marasch (Nordsyrien). Die übrigen drei Weibchen (Constantine, Mardin und Marasch) sind Paratypen. Die männlichen Genitalien der *constantinana* fand RAZOWSKI von solchen der *osthelderi* stark verschieden, die weiblichen bei den beiden Arten ganz gleich. Dementsprechend beschloß er, daß das von mir als zu *osthelderi* gehörig beschriebene Weibchen von Marasch der *costantinana* zugezogen werden solle. Die von RAZOWSKI veröffentlichten Genitalabbildungen lassen keinen Zweifel, daß die Männchen von *constantinana* und *osthelderi* zu zwei verschiedenen Arten gehören. Die Weibchen der *constantinana* (wenigstens der abgebildete Allotypus dieser Art) ist mit *osthelderi* konspezifisch. Im Grunde ist es gar nicht zu verwundern, weil das von RAZOWSKI und das von

mir untersuchte Weibchen aus ein und derselben Lokalität (Marasch) stammen. Es bleibt dagegen unverständlich, warum RAZOWSKI gerade dieses aus Marasch stammende Weibchen und nicht das aus Constantine als Allotypus seiner neuen Art gewählt hat. Solange die Genitalien dieses letzteren Weibchens nicht untersucht sind, sehe ich keinen Grund die Weibchen aus Nordsyrien von *osthelderi* artlich zu trennen.

C. alticolana (HS.) (Seite 183)
Nachtrag: RAZOWSKI, 1957, p. 128, t. 18 fig. 1, t. 22 fig. 2, t. 26 fig. 1; 1959, p. 226, t. 20 fig. 27, t. 38 fig. 180, t. 57 fig. 264 (in beiden Arbeiten: Falter, ♂♀-Genitalien); 1961, p. 665; HANNEMANN, 1961, p. 40, fig. 62, t. 6 fig. 23 (Falter, ♂-Genitalien).
ab. **juncta** Réal (Seite 183)
Nachtrag: RAZOWSKI, 1961b, p. 533.
ab. **decaryi** Réal (Seite 183)
Nachtrag: RAZOWSKI, 1961b, p. 533.

C. virgaureana (Tr.) (Seite 182)
Nachtrag: *latior* RÉAL, 1953, Bull. Mens. Soc. Linn. Lyon, vol. 22, p. 60 (*Cnephasia*). — RAZOWSKI, 1957, p. 127, t. 17 fig. 3, 4, t. 22 fig. 1, t. 25 fig. 6 (als *interjectana*); 1959, p. 228, t. 20 fig. 28, t. 38 fig. 181, 182, t. 57 fig. 265 (in beiden Arbeiten: Falter, ♂♀-Genitalien); 1961, p. 665; 1961b, p. 533 (Synonymie); HANNEMANN, 1961, p. 36, fig. 55, t. 2 fig. 18 (Falter, ♂-Genitalien); MacKAY, 1962, p. 25, fig. 26 (Larvalmorphologie).
ab. **confluens** Réal (Seite 183)
Nachtrag: RAZOWSKI, 1959, p. 229; 1961b, p. 529.

Die in meinem Kataloge als eigene Aberrationen angeführten *latior* Réal und *mediocris* Réal sind zu streichen. Die erstere von diesen gehört zur Synonymie der namenstypischen Form der *virgaureana*, die zweite zur *C. communana* (HS.).

C. microstrigana Raz.
microstrigana RAZOWSKI, 1958, Acta Zool. Cracov., vol. 2, p. 578, t. 56 fig. 24, 25, t. 59 fig. 41, t. 62 fig. 56 (Falter, ♂♀-Genitalien) (*Cnephasia*). — RAZOWSKI, 1959, p. 230, t. 20 fig. 29, 30, t. 39 fig. 183, t. 57 fig. 266 (Falter, ♂♀-Genitalien). — Spanien (San Ildefonso).

C. constantinana Raz.
constantinana RAZOWSKI, 1958, Acta Zool. Cracov., vol. 2, p. 576, t. 58 fig. 39 (♂-Genitalien) (*Cnephasia*). — Algerien (Constantine).

Wie bereits oben bei der Besprechung der *C. osthelderi* Obr. erwähnt ist, gehören die von RAZOWSKI (1958) seiner *constantinana* zugezogenen Weibchen (wenigstens solche aus Nordsyrien), sowie die von diesem Autor veröffentlichten Abbildungen der *constantinana*-Weibchen, nicht zu dieser Art sondern zu *osthelderi*. Nähere Angaben über den weiblichen *constantinana*-Paratypus aus Constantine fehlen vorläufig.

C. tianshanica Fil. (Seite 184)

C. genitalana P. & M. (Seite 184)
Nachtrag: RAZOWSKI, 1957, p. 129, t. 19 fig. 1, t. 22 fig. 5, t. 26 fig. 5 (als *conspersana*); 1959, p. 234, t. 21 fig. 33, t. 39 fig. 186, t. 58 fig. 268 (in beiden Arbeiten: Falter, ♂♀-Genitalien); HANNEMANN, 1961, p. 36, fig. 56, t. 2 fig. 19

(Falter, ♂-Genitalien); MacKAY, 1962, p. 26 (Larvalmorphologie). — Schweiz; Oesterreich; Yugoslawien.
ab. **albicans** Réal (Seite 184)
Nachtrag: RAZOWSKI, 1959, p. 235; 1961b, p. 532.
ab. **pseudoalternella** Réal (Seite 184)
Nachtrag: RAZOWSKI, 1959, p. 235; 1961b, p. 532.
ab. **gallicana** Réal (Seite 184)
Nachtrag: RAZOWSKI, 1959, p. 235; 1961b, p. 532.

C. **nigripunctana** Ams.
nigripunctana AMSEL, 1959, Bull. Soc. Ent. Egypte, vol. 43, p. 56, t. 4 fig. 1 (♂-Genitalien) (*Cnephasia*). — Irak.

C. **cinareana** Chrét. (Seite 177)
Nachtrag: *pulmonariana* RÉAL, 1953, Bull. Mens. Soc. Linn. Lyon, vol. 22, p. 61, fig. 5 (♂-Genitalien) (*Cnephasia*); *chrysantheana* (non P. & M.) RAZOWSKI, 1961, Acta Zool. Cracov., vol. 5, p. 663 (*Cnephasia*); SYNON. NOV.: *pulmonaria* RAZOWSKI, 1961, Bull. Mus. Nat. Hist. Nat. (Paris), ser. 2, vol. 32, p. 534 (*Cnephasia*). — RAZOWSKI, 1958a, p. 574, t. 55 fig. 17, 18, t. 58 fig. 37, t. 61 fig. 51; 1959, p. 217, t. 18 fig. 14, t. 37 fig. 173, t. 56 fig. 258 (in beiden Arbeiten: Falter, ♂ ♀-Genitalien); HANNEMANN, 1961, p. 38, fig. 61, t. 2 fig. 21 (Falter, ♂-Genitalien). — Frankreich; Oesterreich; ?Kaukasus; ?Kleinasien.

Wie bei der Besprechung der *C. chrysantheana* (Dup.) bereits erwähnt (s. oben), versucht RAZOWSKI (1961) den Namen *chrysantheana* Duponchel auf *cinareana* Chrétien zu verlegen. Dieser Autor schreibt nicht, ob er die Genitalien des *chrysantheana*-Typus untersucht hat, und beschränkt sich nur mit der Erwähnung, daß der *cinareana*-Typus etwas kleiner und lichter sei. Falls artliche Zusammengehörigkeit der beiden Typen einwandfrei festgelegt würde, auch dann wäre die Uebertragung des Namens *chrysantheana* auf *cinareana* ohne Sanktion der Internationalen Nomenklaturkommission unberechtigt. Im Sinne des Artikels 23 der neuen Nomenklaturregeln (International Code, 1961) ist jeder Autor verpflichtet, die Kommission zu benachrichtigen, falls er nach 1960 einen Namen entdeckt, der mehr als 50 Jahre nicht als ein ältestes Synonym einer gewissen Art gebraucht wurde. Solange kein Antrag auf einen neuen Gebrauch des Artnamens *chrysantheana* gestellt wird und deshalb keine Entscheidung der Kommission ausfiel, soll jeder Ersatz des Artnamens *cinereana* durch sein ältestes Synonym untersagt bleiben. Persönlich bin ich gegen jede Aenderung im eingebürgerten Gebrauch des Artnamens *chrysantheana* und berufe mich auf meine, obwohl im Zusammenhang mit einem anderen Fall geäußerte Argumentation (OBRAZTSOV, 1957, p. 322), die für eine gewünschte Stabilisierung dieses Namens spricht.

C. **nowickii** Raz.
nowickii RAZOWSKI, 1958, Acta Zool. Cracov., vol. 2, p. 573, t. 15 fig. 16, t. 62 fig. 55 (Falter, ♀-Genitalien) (*Cnephasia*). — Mongolei.

C. **zernyi** Raz.
zernyi RAZOWSKI, 1959, Zschr. Wien. Ent. Ges., vol. 44, p. 84, textfig. 6 (♀-Genitalien), t. 3 fig. 4 (Falter) (*Cnephasia*). — Marokko.

Die beiden letzteren Arten sind vorläufig nur als Weibchen bekannt und ihre systematische Einreihung ist nicht geklärt.

C. disparana Kuzn.
disparana Kuznetzov, 1962, Trudy Inst. Zool. Akad. Nauk Kazach. SSR, vol. 18, p. 100, fig. 5, 6 (♂ ♀-Genitalien) (*Cnephasia*). — Transili-Alatau.

Die Originalbeschreibung dieser genitaliter eigentümlich gebauten Art enthält leider keine Angaben über ihre äußeren strukturellen Merkmale, die ihre systematische Einreihung zu *Cnephasia* rechtfertigen könnten. Nach dem Uncus- und Gnathos-Bau, sowie nach den weiblichen Genitalien schließt sich *disparana* den Arten dieser Gattung nahe an, aber sie unterscheidet sich stark von ihnen in der Sacculus-Form. Kuznetsov (1962) vergleicht seine *disparana* mit „*Doloploca*" *dominicana* Kenn., die ich nach ihrem Labialpalpenbau vorläufig der *Eana* Billb. zurechne. Von den *Eana*-Arten unterscheidet sich *disparana* doch durch ihren Gnathos, dessen Spitze deren in der genannten Gattung ganz ungleich ist. Es ist durchaus möglich, daß *disparana*, vielleicht zusammen mit den immer noch wenig bekannten *dominicana* und *agricolana* Kenn., zu einer eigenen, noch unbeschriebenen Gattung gehört.

Species incertae sedis

C. (?) **albatana** Chrét. (Seite 180)

C. (?) **andreana** (Kenn.) (Seite 180)

C. (?) **bogodiana** Trti. (Seite 184)

C. (?) **callimachana** Trti. (Seite 179)

C. (?) **crassifasciana** Joann. (Seite 180)
Nachtrag: Razowski, 1959, p. 219, t. 18 fig. 16 (Typus).

C. (?) **mienshani** (Car.) (Seite 184)

C. (?) **oricasis** Meyr. (Seite 185)
Nachtrag: Razowski, 1961, p. 667.

C. (?) **personatana** Kenn. (Seite 185)
Nachtrag: Razowski, 1958a, p. 566, t. 53 fig. 3 (Typus).

Gattung **Cnephasiella** Adamcz., 1936 (Seiten 108, 185)

Nachtrag: ?*Eana* Zetterstedt, 1840, Ins. Lap., p. 984.
Cnephasianella (lapsus) Benander, 1950, Svensk Insektfauna, pars 10, p. 46.

In der jüngst veröffentlichten Literatur bestreiten Razowski (1957, 1959) und Swatschek (1958) eine generische Absonderung der *Cnephasiella* Adamcz. und *Cnephasia* Curt. Razowski findet die imaginalen Merkmale nur für eine subgenerische Abtrennung dieser beiden Gruppen voneinander genügend. Swatschek bespricht die larvalen Merkmale der *Cnephasiella* als „zu gering" um die Aufstellung einer eigenen Gattung zu rechtfertigen. Diese beiden Ansichten haben ihre gewissen Gründe nur in Bezug auf die meisten gemeinsamen imaginal- und larvalmorphologischen Merkmale der *Cnephasia* und *Cnephasiella* und lassen die

übrigen, nach der Meinung der obigen Autoren anscheinend weniger wichtigen Merkmale unberücksichtigt. Irreführend an sich ist auch die Larvalbiologie der beiden Gattungen, deren Raupen ihr Leben als Minierer beginnen und erst später zwischen den Blättern und Blüten freilebend werden.

Der Autor dieser Zeilen kann dieser Ansicht nicht beitreten und ist der Meinung, daß die Aufstellung der *Cnephasiella* als eine eigene Gattung sich vollständig rechtfertigt. Genitalmorphologisch unterscheiden sich die Weibchen der *Cnephasiella* so stark von denen der *Cnephasia*, daß diese Unterschiede nur durch einen langen Evolutionsprozess erklärt werden können. Die hoch spezialisierten („floricomous") Papillae anales der *Cnephasia*-Arten sprechen für Anerkennung eines phylogenetisch jüngeren Alters dieser Arten. Die gleichen Strukturen der *Cnephasiella* sind dagegen stark generalisiert und die Spezialisierung zeigt sich hier in einer ganz anderen Richtung, nämlich in der Ausbildung eines langen, ausstülpbaren Ovipositors. Die biologische Bedeutung dieser divergenten Spezialisierung ist heute ganz unklar, da im wesentlichen die Eiablage bei den gegenwärtigen Vertretern der *Cnephasia* und *Cnephasiella* nicht unterscheidbar ist. Die Ursache wäre wohl bei den Vorfahren dieser beiden Gattungen zu suchen, deren Biologie kaum jemals geklärt werden kann. Eine Andeutung auf die bei den Vorfahren vorhandenen biologischen Unterschiede liefern kleinere larvalmorphologische Merkmale, die *Cnephasiella* und *Cnephasia* voneinander trennen und die bei der Besprechung der letztgenannten Gattung bereits erwähnt wurden. Von diesen Merkmalen ist das Fehlen eines Analkammes bei *Cnephasiella*-Raupen besonders wichtig und kann als ein Hinweis bewertet werden, daß die Vorfahren der *Cnephasiella* als Raupen echte Bohrer waren. Diese Annahme erklärt gewissermaßen auch das Vorhandensein eines langen Ovipositors bei *Cnephasiella*, der die Eiablage nahe bei der Bohrstelle zweifellos sichern sollte.

C. abrasana (Dup.) (Seite 185)
Nachtrag: RAZOWSKI, 1957, p. 126, t. 17 fig. 1, t. 21 fig. 5, t. 25 fig. 3; 1959, p. 213, t. 18 fig. 10, t. 37 fig. 171, t. 55 fig. 255 (in beiden Arbeiten: Falter, ♂♀-Genitalien); HANNEMANN, 1961, p. 40, fig. 65, t. 6 fig. 24 (Falter, ♂-Genitalien).

C. incertana (Tr.) (Seite 185; als *incertana* und *barbarana*)
Nachtrag: *barbarana* WALSINGHAM, 1900, Ann. & Mag. Nat. Hist., ser. 7, vol. 5, p. 461 (*Tortrix*). — RAZOWSKI, 1957, p. 125, t. 16 fig. 4, t. 21 fig. 4, t. 25 fig. 2 (Falter, ♂♀-Genitalien; als *pasivana*); 1958a, p. 571, t. 60 fig. 50 (♀-Genitalien); 1959, p. 214, t. 18 fig. 11, t. 37 fig. 172, t. 55 fig. 256 (Falter, ♂♀-Genitalien); SWATSCHEK, 1958, p. 62 (Larvalmorphologie); HANNEMANN, 1961, p. 40, fig. 64—64b, t. 2 fig. 16 (Falter, Kopf, Geäder, ♂-Genitalien); MacKAY, 1962, p. 27 (Larvalmorphologie); diese Arbeit, Taf. 3 Fig. 3, 4 (Falter, ♂-Genitalien).

Der Lectotypus der „*Sciaphila*" *minorana* HS. ist ein Männchen (Genitalpräparat No. 5706), als „*minorana* FR, 689" bezettelt (B.M.) Der Lectotypus der „*Tortrix*" *barbarana* Wlsm. ist auch ein Männchen (Genitalpräparat No. 5666, Shar Devesy, Syria, 1893, Leech 61564, B.M.); ein weiteres, gleich bezetteltes und als Weibchen bestimmtes Exemplar (61565) in derselben Sammlung ist auch ein Männchen wie die ganze *barbarana*-Serie im British Museum.

ab. **leucotaeniana** Schaw. (Seite 185)
Nachtrag: RAZOWSKI, 1959, p. 215; 1961b, p. 532 (als *pseudocommunana*).

f. **proincertana** Raz.
proincertana RAZOWSKI, 1958, Acta Zool. Cracov., vol. 2, p. 571, t. 54 fig. 10, t. 60 fig. 48 (Falter, ♀-Genitalien) (*Cnephasia*). — Algerien.
f. **atticana** Raz.
atticana RAZOWSKI, 1958, Acta Zool. Cracov., vol. 2, p. 571, t. 54 fig. 11 (*Cnephasia*). — RAZOWSKI, 1959, p. 215, t. 18 fig. 12 (in beiden Arbeiten: Falter). — Griechenland.
f. **bergueniana** Raz.
bergüniana RAZOWSKI, 1958, Acta Zool. Cracov., vol. 2, p. 572, t. 14 fig. 12, t. 60 fig. 49 (*Cnephasia*). — RAZOWSKI, 1959, p. 215, t. 18 fig. 13, t. 55 fig. 257 (in beiden Arbeiten: Falter, ♀-Genitalien). — Schweiz.

C. **kurdistana** Ams.
kurdistana AMSEL, 1955, Beitr. naturk. Forsch. Südwestdtschl., vol. 14, p. 125, fig. 8, t. 6 fig. 6 (Falter, ♂-Genitalien) (*Cnephasiella*). — Irak.

Die artliche Selbständigkeit dieser Form ist sehr fraglich. Die Vorderflügelzeichnung, wie diese von AMSEL beschrieben und abgebildet ist, liegt im Rahmen der Individualvariabalität der *C. incertana* (Tr.). Auch die männlichen Genitalien weisen keine wesentlichen Unterschiede auf, die *kurdistana* und *incertana* trennen könnten. Die bei *kurdistana* angeblich breiteren Tegumen und Gnathos, geringere Höhe des Tegumen und bedeutendere Länge des Gnathos, eine kräftigere, bis zum Valvenapex reichende costale Verstärkungsleiste und andere für diese Art von AMSEL als wichtig genannte Merkmale, können fast in jeder *incertana*-Serie beobachtet werden. Sogar ein Vergleich der von PIERCE & METCALFE (1922), ADAMCZEWSKI (1936), RAZOWSKI (1957, 1959) und HANNEMANN (1961) veröffentlichten Genitalabbildungen der *incertana* zeigt diese Variabilität. Die Aedoeagus-Form der *kurdistana* und *incertana* scheint ganz gleich zu sein. Aus den oben angegebenen Gründen wäre eine nähere Untersuchung der *kurdistana* und insbesondere der weiblichen Genitalien dieser Form sehr erwünscht.

Gattung **Palpocrinia** Kenn., 1919 (Seiten 109, 185)

KENNEL (1919) stellte diese Gattung in die Nähe von *Tortricodes* Gn. und charakterisierte sie, bis auf die eigenartige Kopf- und Labialpalpenbehaarung, die Flügelform und die gestielten Hinterflügeladern M_3 und Cu_1, als der *Tortrix* L. ähnlich. In Uebereinstimmung mit dieser Angabe und der Falterabbildung des Gattungstypus reihte ich *Palpocrinia* unter den Cnephasiini ein (OBRAZTSOV, 1955, p. 163; 1956, p. 117), an die sie mir am meisten zu erinnern schien. Neulich, als es mir gelang, *P. ottoniana* Kenn. genitaliter zu untersuchen, habe ich mich davon überzeugt, daß diese Art mit den Cnephasiini nichts zu tun hat und zur Tribus Eucosmini gehört. Dementsprechend ist *Palpocrinia* unter den Cnephasiini zu streichen und in die Tribus Eucosmini zu stellen. Näher wird diese Gattung im 6.Teil der Olethreutinae-Abteilung meiner vorliegenden Revision besprochen.

Gattung **Oxypteron** Stgr., 1871 (Seiten 110, 185)

Nachtrag zur Synonymie: *Oporopsamma* GOZMÁNY, 1954, Ann. Hist. Nat. Mus. Nat. Hungar., ser. nova, vol. 5, p. 274. Typus generis (monotypicus designatus): *Cnephasia wertheimsteini* Rbl., 1913.

Als ich den Grundtext der Beschreibung dieser Gattung veröffentlichte, verfügte ich über ein mangelhaftes Material, welches sich nur auf die morphologi-

schen Angaben über manche *Oxypteron*-Männchen beschränkte. Jetzt liegt mir ein viel größeres Material vor, welches durch die Publikationen von Razowski (1957b, 1959, 1961) vervollständigt wird. Die folgenden Nachträge und Berichtigungen ergänzen den bereits veröffentlichten Text.

Die Valva ist nur bei *impar* Stgr. und *palmoni* Ams. länglich trapezförmig, mit einer schmalen, freispitzig endenden Randleiste am Sacculus, und erinnert an die Valva der *Cnephasia*-Arten. Bei *schawerdai* Rbl. ist der Außenteil der Valva nach unten gebogen, obwohl ihre ganze Form der der *impar* nahe steht. Bei *politum* Wlsm. ist die Valva eher dreieckig und hat eine ganz kurze Randleiste am Sacculus. Außerdem hat der Basalteil der Valva eine breite Vertiefung, die der Basalaushöhlung der Olethreutinae ziemlich ähnlich ist. Bei *exiguanum* Lah. ist der Sacculus breit, ohne Randleiste, und hat eine breit abgerundete Außenspitze, die vom Cucullus der Valva durch eine Furche deutlich abgetrennt ist. Die Arten *eremicum* Wlsm. und *wertheimsteini* Rbl. haben eine wohl entwickelte Randleiste am Sacculus, aber die ganze Valvenform erinnert bei diesen Arten eher an die der Gattung *Eana* Billb. Besonders stark entwickelt ist die Randleiste des Sacculus bei *wertheimsteini*, bei welcher sie nach unten gerichtet ist. Bei *eremicum* endet diese Leiste mit einer scharfen Spitze, die der bei *impar* und *palmoni* ähnelt. Bei *homsanum* Ams. erscheint die Randleiste nur als ihre Endspitze an der Basis des Cucullus erhalten und ist durch zwei weitere kleinere Zähnchen am Unterrand des Cucullus begleitet. Die Sklerotisierung des Gnathos ist bei allen bekannten *Oxypteron*-Arten meistens ganz unbedeutend, so daß vom Vorhandensein eines echten Gnathos keine Rede sein kann. Die Form des Aedoeagus ist artlich variabel, aber bei allen Arten ist er mehr oder weniger gebogen. Bei *impar, homsanum, schawerdai, exiguanum* und *eremicum* ist vor der Aedoeagus-Spitze ein Lateralzahn oder Plättchen vorhanden; bei *politum* und *wertheimsteini* endet der Aedoeagus mit einem schmalen distalen Fortsatz.

Wegen des Vorhandenseins eines „floricomous" Ovipositors sind die weiblichen Genitalien der *Oxypteron*-Arten denen der *Cnephasia* oder *Eana* sehr ähnlich. Zuweilen (*exiguanum*) ist auch die Lamella postvaginalis wie bei diesen Gattungen gebaut, aber meistens ist sie ganz membranös oder stark reduziert. Das Antrum ist nur bei *politum* und *eremicum* mehr oder weniger abgesondert und sklerotisiert. Der Ductus bursae ist verschiedenartig gestaltet: bei *politum* ist er ganz kurz, bei *schawerdai* dagegen lang und hat in der Caudalabteilung ein großes, längliches Colliculum, bei *impar* ist er lang und bogenförmig. Bei allen bekannten Arten ist der Corpus bursae membranös und ohne Signum; der Ductus seminalis mündet in den Caudalteil des Corpus bursae.

O. palmoni (Ams.) (Seite 185)
Nachtrag: Iran.

O. impar Stgr. (Seite 186)
Nachtrag: Razowski, 1959, p. 264, t. 25 fig. 68, 69, t. 46 fig. 217, t. 61 fig. 286 (Falter, ♂ ♀-Genitalien); diese Arbeit, Taf. 4 fig. 4 (♀-Genitalien).

O. schawerdai (Rbl.) comb. nova (Seite 192; S. 186, als *neogenum*)
schawerdai Rebel, 1936, Iris, vol. 50, p. 93 (*Doloploca*); ? *impar* (non Stgr.) Lhomme, 1939, Cat. Lép. France & Belg., vol. 2, p. 270 (*Tortricodes*); *polita* (non Wlsm.) Amsel, 1948, Bull. Soc. Fouad Ier Ent., vol. 32, p. 301, fig. 4 (♂-Genitalien)

(*Oxypteron*); Synon. nov.: *neogena* Gozmány, 1954, Ann. Hist. Nat. Mus. Nat Hungar., ser. nova, vol. 5, p. 274, fig. 1—3 (Fühler, ♂-Genitalien) (*Oxypteron, Psammozesta*); *neogenum* Obraztsov, 1956, Tijdschr. v. Ent., vol. 99, p. 186 (*Oxypteron*); *palmoni* (non Ams.) Razowski, 1959, Acta Zool. Cracov., vol. 4, p. 410, t. 61 fig. 285 (♀-Genitalien) (*Oxypteron*). — Razowski, 1959, p. 263, t. 25 fig. 66, 67, t. 46 fig. 216 (Falter, ♂-Genitalien; als *politum*). — Spanien; Südwestfrankreich.

Nachdem es mir gelang, den Typus von „*Tortricodes*" *polita* Wlsm. zu untersuchen, wurde es klar, daß *neogena* Gozm. mit dieser Art nicht identisch ist. Razowski (1959) hatte Amsels (1948) Angabe über *polita* der *neogena* ganz richtig gleichgestellt und später (Razowski, 1959a) zog er noch „*Doloploca*" *schawerdai* Rbl. als ihr Synonym hinzu. Nach dem Prioritätsgesetz muß die von Gozmány (1954) als *neogena* beschriebene und von Amsel und Razowski irrtümlicherweise als *polita* behandelte Art *Oxypteron schawerdai* (Rebel) comb. nova heißen.

O. homsanum Ams. (Seite 186)

O. politum (Wlsm.) (Seite 186)
Berichtigung: „Amsel, 1948," etc. und „Spanien" sind bei dieser Art zu streichen. Nachtrag: Diese Arbeit, Taf. 4 Fig. 5—7 (♂-Genitalien).

Der Holotypus von *politum* ist ein Männchen (Genitalpräparat No. 5676, Philippeville, Algerien, 16. October 1905; 97737; B.M.), dessen Genitaluntersuchung zeigt, daß mit dieser Art eine andere, *neogena* Gozm. (= *schawerdai* Rbl.) in der Literatur (Amsel, 1948; Razowski, 1959) verwechselt wurde. Die männlichen Genitalien von *O. politum* unterscheiden sich von denen der anderen Arten der Gattung durch eine unregelmäßig dreieckige Valva, die an der Basis eine große Vertiefung hat, welche an die bei den Olethreutinae vorhandene Basalaushöhlung der Valva erinnert. Der Sacculus ist kurz und an seiner Spitze rückwärts ausgebogen, so daß am unteren Valvenrande ein kleiner, eckiger Ausschnitt entsteht. Die Fultura superior ist schmal (das Präparat ist in diesem Teil beschädigt). Der Aedoeagus, ähnlich wie dieser von *Tortricodes tortricella* (Hb.), endet mit einem ganz schmalen Fortsatz. Das Weibchen von *politum* ist unbekannt.

O. exiguanum (Lah.) (Seite 186)
Berichtigung: ?Nordwestafrika. Nachtrag: Razowski, 1959, p. 262, t. 25 fig. 65, t. 46 fig. 215 (Falter, ♂-Genitalien); diese Arbeit, Taf. 4 fig. 1—3 (♂ ♀-Genitalien).

Die Untersuchung der beiden typischen Exemplare von „*Tortricodes*" *chapmani* Wlsm. aus Sizilien (Lectotypus: Männchen, Genitalpräparat No. 5702, Taormina, 27. August 1905, 71933; lectallotypus: Weibchen, Genitalpräparat No. 5704, dieselbe Lokalität, 23 August 1905, 71934; B.M.) gibt uns die Möglichkeit, die in der Literatur vorhandenen Angaben über die Genitalmorphologie von *O. exiguanum* zu vervollständigen. Die Fultura superior, die auf der Abbildung von Razowski (1959) fehlt, ist gut entwickelt, etwa flach dreieckig. Die weiblichen Genitalien zeichnen sich durch ein kapselförmiges Antrum aus, das zwei schmale, analwärts gerichtete Auswüchse trägt und etwas an die Frucht der *Trapa natans* erinnert; Lamella antevaginalis mit zwei lateralen Flügeln.

Diese Art wurde nach Exemplaren aus Sizilien beschrieben und ist vorläufig nur von dieser Insel bekannt. RAZOWSKI (1959) erwähnt noch Korsika als Fundort von *exiguanum*, aber seine Angabe beruht auf einem fehlerhaften Zettel: „Cors. Palermo, 4.IV.1907:" Bekanntlich befindet sich Palermo auf Sizilien und die Angabe von Korsika ist ein Irrtum. Ob die Falter aus Algerien (WALSINGHAM, 1907) zu *exiguanum* gehören, bedarf einer Nachprüfung. Nach CHAPMAN (1907) lebt die Raupe von *exiguanum* im April in Anemone-Blumen; die Falter fliegen im August und September.

O. eremicum (Wlsm.) (Seite 186; als *partitanum* und *eremicum*)

eremica WALSINGHAM, 1907, Ent. Mo. Mag., vol. 43, p. 194 (*Tortricodes*); SYNON. NOV.: *partitanum* CHRÉTIEN, 1915, Ann. Soc. Ent. France, vol. 84, p. 297 (*Oxypteron*); *eremicum* OBRAZTSOV, 1956, Tijdschr. v. Ent., vol. 99, p. 118 (*Oxypteron*); *partinatum* (err.) RAZOWSKI, 1961, Acta Zool. Cracov., vol. 5, p. 684, t. 87 fig. 5 (♂-Genitalien) (*Oxypteron*). — AMSEL, 1948, p. 301, fig. 5, 11 (Labialpalpus, ♂-Genitalien); p. 302 (als *partitana*); RAZOWSKI, 1961, p. 668, t. 91 fig. 22 (♀-Genitalien; als *partitanum*); diese Arbeit, Taf. 3 Fig. 5—7 (Falter, ♂-Genitalien). — Nordwestafrika (Tunis; Algerien).

Von *eremicum* gelang es mir, ihren Holotypus zu untersuchen: Männchen (Genitalpräparat No. 5677), Hammam-es-Salahin, Algerien, 15. März 1904 (97516), B.M. Die Genitalien dieses Männchens unterscheiden sich etwas von den von AMSEL (1948) veröffentlichten, aber diese Unterschiede sind wohl mehr auf die Präparationstechnik und starke Schematisierung der AMSELschen Figur zurückzuführen. Wie bei dem Holotypus ist auch auf dieser Figur die äußere transversale Begrenzung des Sacculus, die ihn vom Cucullus abtrennt, deutlich zu sehen. Bei dem Holotypus ist der Basalteil des Sacculus viel breiter als dies von AMSEL wiedergegeben ist. Auch der Cucullus ist kürzer und von außen deutlich abgerundet, während die AMSELsche Abbildung ihn als ganz schmal darstellt. RAZOWSKI (1961) veröffentlichte die männlichen Genitalien von *partitanum* und diese weisen keine Unterschiede auf, die diese Art von *eremicum* trennen könnten. Wie AMSEL, hat auch RAZOWSKI die Fultura superior übersehen, die bei *eremicum* schwach sklerotisiert und ganz schmal ist. RAZOWSKI untersuchte und bildete auch die weiblichen Genitalien von *partitanum* ab. Obwohl er „bursa copulatrix small" schreibt, ist auf seiner Abbildung gar keine Bursa copulatrix vorhanden, die beim Präparieren möglicherweise verloren ging. Der als Bursa copulatrix bezeichnete Teil gehört zweifellos zum Antrum, das an solches von *politum* gewissermaßen erinnert.

O. wertheimsteini (Rbl.) (Seite 191)

Nachtrag: *amseli* RAZOWSKI, 1957, Beitr. naturk. Forsch. Südwestdtschl., vol. 16, p. 101, fig. 1 (♂-Genitalien), t. 2 fig. 1 (Falter) (*Oxypteron*); *wrtheimsteini* (err.) RAZOWSKI, 1959, Acta Zool. Cracov., vol. 4, p. 380, t. 46 fig. 218 (♂-Genitalien) (*Oxypteron*). — RAZOWSKI, 1959, p. 265, t. 25 fig. 70, t. 61 fig. 287 (♀-Genitalien, Falter).

Gattung Tortricodes Gn., 1845 (Seiten 111, 186)

Nachtrag: *Cheimonophila* (non Dup.) BRUAND, 1847, Cat. Microlép. Doubs, Mém. Soc. emul. Doubs, p. 54, nota 61.

Der Gattungsname ist männlich (vgl. Internationale Code, 1961, Artikel 30, a, II) und dementsprechend bedürfen alle Artnamen dieser Gattung eine Endung *-us*. Die in meinem Kataloge als eine *Tortricodes*-Art angeführte *ignavana* Chr. gehört zur Gattung *Kawabeia* gen. nov., deren Beschreibung in dieser Arbeit erfolgt. Die nach einem einzigen weiblichen Exemplare aufgestellte *T. violellus* Raz. bedarf eines näheren Studiums. Wie aus den von Razowski (1956, 1959) veröffentlichten Fotos sich ersehen läßt, ist der Holotypus dieser Art ein nicht frisches und anscheinend stark öliges Stück, bei welchem die Flügelfransen zusammengeklebt sind. Die Genitalien dieses Weibchens erinnern stark an die von *T. tortricellus* und unterscheiden sich von diesen hauptsächlich durch das Signum. Dieses besteht bei *violellus* aus zwei voneinander getrennt liegenden Stacheln, eine ganz klein, die andere dagegen sehr lang. Solch eine Signum-Form ist der ganzen Tribus Cnephasiini ganz fremd und man kann annehmen, daß es gegebenenfalls um eine Mißbildung handelt.

T. tortricellus (Hb.) (Seite 186)

Nachtrag: Razowski, 1957, p. 120, t. 14 fig. 4, t. 20 fig. 2, t. 23 fig. 5, 6; 1959, p. 267, t. 25 fig. 72, t. 26 fig. 73, t. 47 fig. 219, t. 61 fig. 269 (in beiden Arbeiten: Falter, ♂♀-Genitalien); Swatschek, 1958, p. 59, fig. 59, 60 (Larvalmorphologie); Hannemann, 1961, p. 41, fig. 66—66b, t. 4 fig. 24 (Falter, Kopf, Geäder, ♂-Genitalien).

T. violellus Raz.

violellus Razowski, 1956, Zeitschr. Wien. Ent. Ges., vol. 41, p. 204, fig. 1, 2 (*Tortricodes*). — Razowski, 1959, p. 267, t. 25 fig. 71, t. 61 fig. 288 (in beiden Arbeiten: Falter, ♀-Genitalien). — Spanien (S. Maria d. Lago).

T. (?) adamanus Kenn. (Seite 186, als *adamana*)

Gattung **Kawabeia** gen. nov.

Typus generis: *Cheimatophila ignavana* Chr., 1881.

Cheimatophila (non Stph.) Christoph, 1881, Bull. Soc. Imp. Nat. Moscou, vol. 56, fasc. 1, p. 73.

Tortricodes (non Gn.) Kennel, 1910, Pal. Tortr., p. 225.

Der *Tortricodes* Gn. bis auf Folgendes ähnlich: Vorderflügelader R_1 entspringt von oder etwas distal von der Mitte der Mittelzelle; R_5 mündet in den Apex oder hoch in den Termen; Cu_1 entspringt deutlich vor dem unteren Winkel der Mittelzelle. Hinterflügeladern R und M_1 an der Basis einander stark genähert, oder sie entspringen aus einem Punkt, oder sind gestielt.

Männliche Genitalien (Taf. 3 Fig. 8, 9). Tegumen mäßig bis ziemlich breit; Pedunculi nach unten verschmälert; Saccus breit abgerundet oder winklig. Valva länglich, an der Basis breit, im Cucullus-Teil wieder etwas erweitert; Costa mehr oder weniger sklerotisiert; Sacculus mit der Valva verwachsen, wenig sklerotisiert, basal röhrenförmig gewölbt, oder er ist stärker sklerotisiert und endet mit einer freien Spitze; Pulvinus und Processus basalis fehlen. Uncus ziemlich robust, gebogen, mit kleinen Dörnchen bedeckt; Gnathos mit einer mehr oder weniger breiten, akuten Mittelspitze; Socii rudimentär, als behaarte kleine Kissen an Tegumenseiten sitzend, oder rund, hängend. Fultura superior vollständig, mehr oder weniger breit. Caulis ziemlich lang, nach unten mehr oder weniger verjüngt. Aedoeagus stark gebogen, schmal röhrenförmig, unten mit einem langen Aus-

wuchs, so daß in der Lateralansicht der Aedoeagus gabelig aussieht; Coecum penis lang; keine Cornuti.

Weibliche Genitalien (KAWABE, 1963, Abb. 2, 4). Papillae anales „floricomous", mit großen, breiten Distallappen und viel kürzeren und schmäleren inneren Lappen. Sterigma breit; Lamella antevaginalis ganz klein; Dorsalteil des Sinus vaginalis membranös. Antrum birnförmig, zum Ostium schmäler. Corpus bursae rund, membranös, ohne Signum.

Diese neue Gattung steht der *Tortricodes* Gn. nahe, aber unterscheidet sich sogleich von dieser durch die Vorderflügelader Cu_1, die noch vor dem Ende der Mittelzelle entspringt. Die Genitalien beider Gattungen sind stark unterschieden. Besonders eigenartig ist der gabelige Aedoeagus der neuen Gattung. Sie ist nach Herrn ATSUSHI KAWABE (Kisuki, Kawasaki, Japan) genannt, dessen Publikation wichtige morphologische Angaben enthält, welche viel zur Kenntniss der Gattung beigetragen haben.

K. ignavana (Chr.) comb. nova (Seite 186)
Nachtrag: Diese Arbeit, Taf. 3 Fig. 8, 9 (♂-Genitalien).

Der Holotypus der *ignavana* Chr. ist ein Männchen aus Nikolsk, Ussuri (Genitalpräparat No. 5673) und befindet sich im British Museum. Die von KAWABE (1963, p. 5, textfig. 1—2, t. 3 fig. 5, 9—11) unter diesem Namen ausführlich gekennzeichnete und abgebildete Art aus Japan ist mit der echten *ignavana* nicht konspezifisch und bedarf deshalb einen neuen Namen. Nach den publizierten Fotografien ist es schwierig über die äußeren Unterschiede dieser Art zu urteilen und sie mit *ignavana* zu vergleichen, da die Variabilität dieser letzteren nicht bekannt ist. Die männlichen Genitalien der von KAWABE behandelten Art unterscheiden sich von denen der *ignavana* in mehreren Einzelheiten, abgesehen von der Valvenform, die nach KAWABE's Angabe variabel und von der Präparationstechnik abhängig sei. Bei den Faltern aus Japan ist der Sacculus fast gerade, während er bei *ignavana* deutlich geknickt ist. Die Seitenarmen des Tegumen sind schmäler als in *ignavana* und seine Endspitze ist weniger robust, der Uncus ist kürzer und distal weniger verjüngt und die Socii sind deutlich ausgezogen und distal erweitert. Besonders auffallend sind die Unterschiede im Aedoeagus-Bau: bei der Art aus Japan ist die Aedoeagus-Spitze nicht so schmal wie in *ignavana* und die untere Stützplatte ist viel dicker und distal mit stärkeren Dörnchen besetzt.

K. razowskii (Kawabe) comb. nova.
ignavana (non Chr.) ISSIKI, 1957, Icones Ins. Japon. Color. Nat., vol. [1], p. 84, t. 14 fig. 433 (Falter) (*Tortricodes*); *razowskii* KAWABE, 1963, Tinea, vol. 6, p. 7, textfig. 3—4, t. 3 fig. 6—8 (Falter, ♂♀-Genitalien) (*Tortricodes*). — OKANO, 1959, p. 266, t. 177 fig. 20 (Falter; als *ignavana*). — Japan.

Gattung **Exapate** Hb., 1825 (Seiten 113, 187)

Nachtrag: *Phalaena Pyralis* (part.) LINNÉ, 1767, Syst. Nat., ed. 12, p. 883.

Es ist kein Zweifel, daß es sich bei *E. duratella* Heyd. um eine von *E. congelatella* (Cl.) verschiedene, obwohl anscheinend junge Art handelt. Die beiden Arten unterscheiden sich voneinander in der Flügelform und -färbung, durch die männ-

lichen Genitalien und auch larvalmorphologisch und -biologisch. Die in meinem Kataloge als eine Unterart der *congelatella* angeführte *tibetana* Caradja gehört zur Gattung *Eana* Billb. (briefliche Mitteilung des Dr. J. RAZOWSKI).

E. **congelatella** (Cl.) (Seite 187)
Nachtrag: RAZOWSKI, 1957, p. 120, t. 14 fig. 3, t. 20 fig. 1, t. 23 fig. 3, 4; 1959, p. 307, t. 31 fig. 115, 116, t. 53 fig. 245, t. 67 fig. 314 (in beiden Arbeiten: Falter, ♂♀-Genitalien); SWATSCHEK, 1958, p. 65, fig. 65 (Larvalmorphologie); HANNEMANN, 1961, p. 41, fig. 67—67b, t. 4 fig. 21 (Falter, Kopf, Geäder, ♂-Genitalien).
ab. **kenneli** Schille (Seite 187)
Nachtrag: RAZOWSKI, 1959, p. 308.

E. **duratella** Heyd. (Seite 187)
Nachtrag: *congelatella* (part.) BRADLEY & MARTIN, 1956, Ent. Gaz., vol. 7, p. 153 (*Exapate*). — SWATSCHEK, 1958, p. 65, fig. 66 (Larvalmorphologie); RAZOWSKI, 1959, p. 309, t. 31 fig. 117—119, t. 53 fig. 246, t. 67 fig. 315 (Falter, ♂♀-Genitalien); HANNEMANN, 1961, p. 42, t. 5 fig. 8 (Falter; als *congelatella* f. *duratella*).

Gattung **Neosphaleroptera** Réal, 1953 (Seiten 115, 187)

Nachtrag: *Lophoderus* (part.) WOCKE, 1871, Stgr.-Wck. Cat. Lep. Eur. Faun., p. 237.

N. **nubilana** (Hw.) (Seite 187)
Nachtrag: RAZOWSKI, 1957, p. 125, t. 16 fig. 3, t. 21 fig. 3, t. 24 fig. 6, t. 25 fig. 1; 1959, p. 270, t. 26 fig. 74, 75, t. 47 fig. 220, t. 61 fig. 290 (Falter, ♂♀-Genitalien); SWATSCHEK, 1958, p. 63 (Larvalmorphologie); HANNEMANN, 1961, p. 42, fig. 68—68b, t. 4 fig. 5 (Falter, Kopf, Geäder, ♂-Genitalien).
ab. **perfuscana** Hw. (Seite 187)
Nachtrag: RAZOWSKI, 1959, p. 270.

Gattung **Epicnephasia** Danil., 1963

Typus generis (monot. design.): *Epicnephasia mongolica* Danil., 1963.
Epicnephasia DANILEVSKY, 1963, Rev. Ent. URSS, vol. 42, p. 170.

Kopf und Labialpalpen dicht und sehr lang behaart. Fühler undicht bewimpert; die Wimpern etwa zweieinhalbmal so lang wie die einzelnen Fühlerglieder, an deren Basis sie einreihig sitzen. Labialpalpen gerade, länger als der Kopf.

Vorderflügel länglich, mäßig breit, im Außenteil lanzettförmig, beim Weibchen stark reduziert; Costa fast gerade; Apex stark zugespitzt; Termen sehr schräg, leicht konvex; Tornus breit abgerundet, kaum auffällig; Dorsum ganz schwach gebaucht. Kein Costalumschlag beim Männchen. 12 Adern; S ziemlich gerade, kurz vor Costa aufgebogen; R_1 kurz, wellig, etwa bei drei Viertel der Mittelzelle entspringend; R_2 etwa in der Mitte zwischen R_1 und R_3, von beiden weit entfernt; R_3 entspringt aus dem oberen Winkel der Mittelzelle, R_4 von der Discalader (?!); R_5 mündet in den Apex; R_3 bis M_1 an der Basis gleich weit voneinander entfernt, viel näher zueinander als R_2 und R_3; Innenader der Mittelzelle fehlt; M_2 und M_3 entspringen aus einem Punkt am unteren Winkel der Mittelzelle; Cu_1 entspringt kurz vor diesem Winkel und etwa dreimal näher zum Winkel als zu Cu_2; die letztere Ader entspringt hinter drei Viertel der sämtlichen Mittelzellenlänge; A_1 unentwickelt, nur an der Basis leicht angedeutet; A_{2+3} flach ∽-förmig; ihre Basalgabel etwa ein Viertel so lang wie die ganze Ader.

Hintelflügel länglich trapezförmig, etwas breiter als die Vorderflügel; beim Weibchen fehlen sie; Costa ganz sanft aufgebogen, fast gerade; Apex spitz; Termen schräg, gerade; Tornus breit abgerundet; Dorsum im äußeren Teil leicht eingezogen; Analwinkel abgerundet und der innere Teil des Dorsum fast gerade. 8 Adern; S ähnlich wie im Vorderflügel; R und M_1 entspringen aus einem Punkt am oberen Winkel der Mittelzelle; M_2 und M_3 kurz gestielt und entspringen aus dem unteren Winkel der Mittelzelle; Cu_1 etwas basal vor diesem Punkt, zu M_{2+3} stark genähert; Cu_2 entspringt kurz vor dem Ende der Mittelzelle; alle drei Analadern vorhanden.

Männliche Genitalien. Tegumen mäßig breit; Pedunculi ziemlich schmal. Valva länglich, einfach, im Basalteil breit, im Distalteil schmal, merklich aufgebogen; Sacculus ohne freie Spitze, fast bis zum Ende des erweiterten Valventeils reichend; Pulvinus und Processus basalis fehlen. Uncus ziemlich dick, an der Außenseite kurz samtartig behaart, an der unteren Fläche des Apex mit einem kurzen Borstenpinsel; Socii groß, sklerotisiert, mit langen Borsten besetzt; Gnathos massiv, ohne Auswüchse. Fultura superior schmal bandförmig, am oberen Rande fein bedornt. Aedoeagus ziemlich lang und mäßig dick, im Basalteil nach unten gebogen, weiter gerade, im Distaldrittel offen von oben; keine Cornuti.

Weibliche Genitalien mit breiten, „floricomous" Papillae anales; weitere Angaben fehlen.

Die obige Beschreibung gründet sich auf die Originalangaben, die von DANILEVSKY (1963) in russischer Sprache veröffentlicht wurden. Seine Abbildungen des Flügelgeäders und der männlichen Genitalien, die an dieser Stelle wiederzugeben wohl unzweckmässig wäre, dienten auch zur Vervollständigung dieser Beschreibung.

Die Flügelreduktion beim Weibchen und das Geäder des Männchens sprechen zugunsten einer Verwandtschaft der *Epicnephasia* mit *Exapate* Hb., aber die männlichen Genitalien unterscheiden sich stark von denen in der letztgenannten Gattung. Ganz eigenartig sind die stark sklerotisierten Socii, die noch bei keiner palaearktischen Cnephasiini-Gattung bekannt sind. Monotypisch.

E. mongolica Danil.
mongolica DANILEVSKY, 1963, Rev. Ent. URSS, vol. 42, p. 171, fig. 8, 9 (Geäder, ♂-Genitalien) (*Epicnephasia*). — Mongolei.

Gattung Eana Billb., 1820 (Seite 116)

Berichtigung: In der Synonymie ist *Oporopsamma* Gozm. zu streichen.

Wie die *Cnephasia*-Arten sind neuzeitlich auch die der Gattung *Eana* einem eingehenden Studium, hauptsächlich durch Herrn J. RAZOWSKI unterworfen worden. Leider sind mehrere neue Arten auf Grund eines ziemlich geringen Materials, zuweilen nach einem einzigen Exemplar aufgestellt, so daß die Individualvariabilität nur ausnahmsweise berücksichtigt werden konnte. Deshalb ist die Selbständigkeit einiger dieser Arten bisweilen wenig überzeugend. Man kann aber hoffen, daß dieses bald in Ordnung gebracht wird.

Außer sieben Arten, die vorläufig den „Species incertae sedis" zugerechnet werden sollten, schließt die Gattung *Eana* gegenwärtig 32 palaearktische Arten

ein, deren Zugehörigkeit zu dieser Gattung außer jedem Zweifel steht. Von 24 *Eana*-Arten meines vorherigen Kataloges sind *tyrrhaenica* Ams. und *ecullyana* Réal (die beiden sind Synonyme) zu *Cnephasia* Curt. und *wertheimsteini* Rbl. zu *Oxypteron* Stgr. gerechnet. Dagegen sind *vetulana* Chr. und *tibetana* Car., die erstere aus *Cnephasia* Curt., die zweite aus *Exapate* Hb., in die Gattung *Eana* übergeführt worden. Auf Grund der neuen morphologischen Angaben erwies es sich möglich eine neue subgenerische Aufteilung der Gattung *Eana* zu geben (Obraztsov, 1963). Der nachstehende Bestimmungsschlüssel gibt eine Vorstellung von dieser Klassifikation:

1. Uncus deutlich in einen schmalen, länglichen Apikalteil und einen stark erweiterten, gut abgesonderten Basalteil, dessen flache „Schultern" auf dem Tegumen-Dach ruhen, aufgeteilt .... Untergattung *Eana* Billberg

Uncus mehr oder weniger kegelförmig, oder an der Basis schräge „Schultern" bildend 2

2. Uncus im Apikalteil schlank, mit schrägen, zum Tegumen-Dach herabfallenden „Schultern"; Gnathos einfach; Aedoeagus mit einem dreieckigen Dorn vor seiner Spitze. Sterigma breit, mit caudalen Winkeln analwärts gerichtet; Antrum röhrenförmig .... Untergattung *Ablabia* Hübner

Uncus mehr oder weniger kegelförmig, zur Basis gleichmäßig erweitert; Gnathos mit einem Mittelauswuchs; Aedoeagus glatt. Sterigma ziemlich schmal, mit caudalen Winkeln lateral oder etwas kopfwärts gerichtet; Antrum trichterförmig ... . *Subeana* Obraztsov

Sg. **Ablabia** Hb., 1825 (Seite 188)

E. (A.) **argentana** (Cl.) (Seite 188)

Nachtrag: *colossa* Caradja, 1916, Iris, vol. 30, p. 48 (*Cnephasia*). — Razowski, 1957, p. 122, t. 15 fig. 2, t. 20 fig. 4, t. 24 fig. 1; 1959, p. 274, t. 26 fig. 76, t. 47 fig. 221, t. 61 fig. 291 (in beiden Arbeiten: Falter, ♂♀-Genitalien); Swatschek, 1958, p. 67, fig. 68 (Larvalmorphologie); Hannemann, 1961, p. 44, fig. 69, t. 5 fig. 5 (Falter, ♂-Genitalien); Obraztsov, 1963, p. 176, 179, fig. 1, 5 (♂♀-Genitalien).

Berichtigung: Kennel, 1910 [statt Kennel, 1919].

ssp. **plumbeana** Kenn. (Seite 188)

Die als eine eigene Unterart angegebene ssp. *colossa* ist im Kataloge zu streichen.

E. (A.) **osseana** (Sc.) (Seite 188)

Nachtrag: *angulella* Thunberg & Wenner, 1794, Diss. Ent., vol. 7, p. 83 (*Tinea*). — Razowski, 1957, p. 122, t. 15 fig. 1, t. 20 fig. 3, t. 23 fig. 7; 1959, p. 275, t. 26 fig. 78, t. 47 fig. 222, t. 62 fig. 292 (in beiden Arbeiten: Falter, ♂♀-Genitalien); 1961b, p. 530; Hannneman, 1961, p. 44, fig. 70 (♂-Genitalien); Obraztsov, 1963, p. 176, 187, fig. 7 (♀-Genitalien). — Kaukasus.

Berichtigung: Westwood, 1840, Introd. modern class. ins., vol. 2, Synopsis, p. 108 (*Ablabia*) [statt Wood & Westwood, 1852, etc.].

ab. **impunctana** Strand (Seite 188)

Nachtrag: Razowski, 1957, t. 23 fig. 8; 1959, t. 26 fig. 77 (in beiden Arbeiten: Falter, als *osseana*), p. 275; 1961b, p. 530; Hannemann, 1961, t. 5 fig. 9 (Falter, als *osseana*); Obraztsov, 1963, p. 176, 188, 190.

ssp. **niveosana** Pack. (Seite 188)
Nachtrag: OBRAZTSOV, 1963, p. 176, 190, fig. 3 (♂-Genitalien).

Die bei dieser Art angeführte ssp. *darvaza* Obr. ist hier zu streichen. Nach brieflicher Mitteilung des Herrn J. RAZOWSKI erwies sie sich als eine gute Art (s. unten).

E. (A.) **darvaza** (Obr.), status nov. (Seite 188; als *osseana* ssp.)
darvaza OBRAZTSOV, 1943, Mitt. Münchn. Ent. Ges., vol. 33, p. 88 (*Nephodesme*). — West-Pamir.

Sg. **Subeana** Obraztsov, 1962

Typus subgeneris: *Sciaphila canescana* Guenée, 1845.
Subeana OBRAZTSOV, 1963, Journ. Lep. Soc., vol. 16, p. 177.

E. (S.) **rielana** (Réal) (Seite 189)
Nachtrag: RAZOWSKI, 1959, p. 278, t. 48 fig. 233 (♂-Genitalien); 1961b, p. 529.

E. (S.) **hungariae** Raz.
hungariae RAZOWSKI, 1958, Acta Zool. Cracov., vol. 2, p. 568, t. 53 fig. 7, t. 57 fig. 31 (*Eana*). — RAZOWSKI, 1959, p. 279, t. 26 fig. 79, t. 48 fig. 226 (in beiden Arbeiten: Falter, ♂-Genitalien). — ?Ungarn.

E. (S.) **canescana** (Gn.) (Seite 188)
Nachtrag: RAZOWSKI, 1957, p. 123, t. 15 fig. 3, t. 20 fig. 5, t. 24 fig. 2; 1959, p. 279, t. 26 fig. 80, t. 27 fig. 81, 82, t. 48 fig. 224, 225, t. 62 fig. 293 (in beiden Arbeiten: Falter, ♂ ♀-Genitalien); 1961b, p. 530; HANNEMANN, 1961, p. 44, fig. 72, t. 4 fig. 23 (Falter, ♂-Genitalien). — Frankreich; Italien; Yugoslawien; Mazedonien; Oesterreich; Kärnten; Polen.
ab. **montserrati** Réal (Seite 189)
Nachtrag: RAZOWSKI, 1959, p. 280; 1961b, p. 530.
ab. **candidana** Lah. (Seite 189)
Nachtrag: RAZOWSKI, 1959, p. 281.
ab. **venansoni** Réal (Seite 189)
Nachtrag: RAZOWSKI, 1961b, p. 530.

Die bei *canescana* angeführte *filipjevi* ist hier zu streichen und als eine gute Art anzuführen (s. unten).

E. (S.) **filipjevi** (Réal) (Seite 189; als *canescana* ab. und *pyrenaica*)
filipjevi RÉAL, 1953, Bull. Mens. Soc. Linn. Lyon, vol. 22, p. 52 (*Cnephasia, Ablabia*); *livonica* (part.) RÉAL, 1953, ibid., p. 56 (*Cnephasia, Nephodesme*); *pyraenaica* TOLL, 1954, Bull. Soc. Ent. Mulhouse, p. 45, fig. 1, 2, 4 (Vorderflügel, ♂ ♀-Genitalien). — RAZOWSKI, 1959, p. 280 (als *canescana* ab. *filipjevi*), p. 282, t. 27 fig. 83, 84, t. 49 fig. 227, t. 62 fig. 294 (Falter, ♂ ♀-Genitalien, als *pyraenaica*), p. 288 (part.; als *livonica*); 1961, p. 669; 1961b, p. 530. — Südwestfrankreich.

Sg. **Eana** Billb., 1820 (Seite 189)

E. (E.) **nervana** (Joann.) (Seite 191; part.)
nervana JOANNIS, 1908, Bull. Soc. Ent. France, p. 190 (*Cnephasia*). — RAZOWSKI, 1956a, fig. 5, 6, t. 20 fig. 3; 1959, p. 283, t. 27 fig. 85, t. 49 fig. 228, t. 62 fig. 295 (in beiden Arbeiten: Falter, ♂ ♀-Genitalien); 1961, p. 670. — Südostfrankreich; Spanien.

ab. subnervana Raz.
subnervana Razowski, 1956, Zschr. Wien. Ent. Ges., vol. 41, p. 206, fig. 7, t. 20 fig. 4 (*Cnephasia*). — Razowski, 1959, p. 283, t. 27 fig. 86, t. 63 fig. 296 (in beiden Arbeiten: Falter, ♀-Genitalien); 1961, p. 670.

E. (E.) italica (Obr.) (Seite 190)
Nachtrag: *maroccana* (part.) Razowski, 1956, Zschr. Wien. Ent. Ges., vol. 41, p. 206 (*Cnephasia*). — Razowski, 1959, p. 284, t. 27 fig. 87, t. 49 fig. 229, t. 63 fig. 297 (Falter, ♂♀-Genitalien); 1961, p. 670. — Griechenland.

E. (E.) maroccana Fil. (Seite 191)
Nachtrag: Razowski, 1956a, p. 206, fig. 3, 4, t. 20 fig. 1, 2 (Falter, ♂♀-Genitalien); 1961, p. 670.

E. (E.) cottiana (Chrét.) (Seite 191)
Nachtrag: Razowski, 1959, p. 285, t. 27 fig. 88, t. 28 fig. 89, t. 49 fig. 230, t. 63 fig. 298 (Falter, ♂♀-Genitalien).
ab. buvati Réal (Seite 191)
Nachtrag: Razowski, 1959, p. 286; 1961b, p. 531.
ssp. pyrenaea Réal (Seite 191)
Nachtrag: Razowski, 1959, p. 286; 1961b, p. 530.

E. (E.) rastrata (Meyr.) (Seite 190)
Nachtrag: *raetrata* Razowski, 1961, Acta Zool. Cracov., vol. 5, p. 684 (*Eana*). — Clarke, 1958, p. 88, t. 44 fig. 3—3b (Falter, ♂-Genitalien); Razowski, 1959, p. 302; 1961, p. 669, t. 87 fig. 6, t. 91 fig. 23 (♂♀-Genitalien).

E. (E.) schoenmanni Raz.
schönmanni Razowski, 1959, Zschr. Wien. Et. Ges., vol. 44, p. 85, fig. 7, t. 3 fig. 6 (Falter, ♀-Genitalien) (*Eana*). — Marokko.

E. (E.) kuldjaensis Raz.
kuldjaënsis Razowski, 1959, Zschr. Wien. Ent. Ges., vol. 44, p. 84, fig. 4, t. 3 fig. 5 (Falter, ♂-Genitalien) (*Eana*). — Kuldscha.

E. (E.) penziana (Thnbg.) (Seite 190)
Nachtrag: *alpestris* (part.) Réal, 1953, Bull. Mens. Soc. Linn. Lyon, vol. 22, p. 55 (*Cnephasia, Nephodesme*); *livonica* (part.) Réal, 1953, ibid., p. 56 (*Cnephasia*; *Nephodesme*). — Razowski, 1957, p. 124, t. 16 fig. 2, t. 21 fig. 2, t. 24 fig. 5; 1959, p. 287, t. 28 fig. 90, 91, t. 50 fig. 231, 232, t. 63 fig. 299 (in beiden Arbeiten: Falter, ♂♀-Genitalien); 1961, p. 672; 1961b, p. 532; Hannemann, 1961, p. 46, fig. 73—73b, t. 5 fig. 10 (Kopf, Geäder, Falter, ♂-Genitalien).
ab. bellana Curt. (Seite 190)
Nachtrag: Razowski, 1959, p. 288, 1961b, p. 531.
ab. alpestris Réal (Seite 190)
Nachtrag: Razowski, 1959, p. 288; 1961b, p. 532.
ab. amseli Raz.
amseli Razowski, 1959, Acta Zool. Cracov., vol. 4, p. 288, t. 28 fig. 92, t. 50 fig. 233 (Falter, ♂-Genitalien) (*Eana*).
ssp. (?f.) colquhounana Barr. (Seite 191)
Nachtrag: Razowski, 1959, p. 289, t. 28 fig. 93, t. 50 fig. 234, t. 64 fig. 300 (Falter, ♂♀-Genitalien).
ssp. fiorana Raz.
fiorana Razowski, 1959, Acta Zool. Cracov., vol. 4, p. 289 (*Eana*); *fiorii* Razowski, 1959, ibid., p. 344, 390, t. 28 fig. 94, t. 51 fig. 235 (Falter, ♂-Genitalien) (*Eana*). — Italien (Abruzzen).

Die bei *penziana* als selbständige Aberration angeführte *livonica* ist an dieser Stelle zu streichen. Der Holotypus dieser Form erwies sich als mit der namenstypischen *penziana* synonymisch, der Allotypus ist mit *E. filipjevi* (s. oben) identisch.

E. (E.) viridescens (Raz.)
viridescens RAZOWSKI, 1957, Beitr. naturk. Forsch. Südwestdtschl., vol. 16, p. 104, fig. 4 (♂-Genitalien) (*Cnephasia, Nephodesme*). — RAZOWSKI, 1959, p. 290, t. 28 fig. 95, t. 51 fig. 236 (Falter, ♂-Genitalien). — Nordkaukasus (Fluss Zeja).

E. (E.) incanana (Stph.) (Seite 189)
Nachtrag: RAZOWSKI, 1957, p. 123, t. 15 fig. 4, t. 20 fig. 6, t. 24 fig. 3; 1959, p. 291, t. 28 fig. 96, t. 29 fig. 97, t. 51 fig. 237, t. 64 fig. 301 (in beiden Arbeiten: Falter, ♂ ♀-Genitalien); HANNEMANN, 1961, p. 44, fig. 72, t. 4 fig. 23 (Falter, ♂-Genitalien).

E. (E.) freii (Web.) (Seite 182; als *Cnephasia chrysantheana* ab.)
freii WEBER, 1945, Mitt. Schweiz. Ent. Ges., vol. 19, p. 359, t. 1 fig. 1 (*Cnephasia*). — SAUTER, 1961, p. 272, t. 2 fig. 1, 3 (♂ ♀-Genitalien; Biologie; Systematik). — Schweiz.

Vielleicht nur eine Form der vorigen Art. Die Genitalunterschiede sind sehr gering. Die Raupe lebt auf *Allium ursinum*, während die der *incanana* auf *Vaccinium, Scilla* und anderen gefunden wurde (SAUTER, 1961).

E. (E.) infuscata (Réal) (Seite 189; als *Eana incanana* ab.)
dumonti (part.) RÉAL, 1953, Bull. Mens, Soc. Linn. Lyon, vol. 22, p. 53, fig. 2 (♀-Genitalien) (*Cnephasia, Nephodesme*); *infuscata* RÉAL, 1953, ibid., p. 54 (*Cnephasia, Nephodesme*). — RAZOWSKI, 1959, p. 292; 1961, p. 670; 1961b, p. 531. — Elsaß; Galizien; Ostrußland (Sarepta).

Die artliche Selbständigkeit der *infuscata,* die als eine Unterart der *incanana* aufgestellt wurde, gründet sich hauptsächlich auf die äußeren Merkmale. „The genitalia of the members of this group," schreibt RAZOWSKI (1961), „show only slight specific differences," aber er präzisiert nicht um welche Unterschiede es sich hier handelt. Da *infuscata* weit verbreitet ist und ihr Verbreitungsgebiet mit dem der *incanana* im allgemeinen zusammenfällt, kann man vermuten, daß es sich hier wie bei *E. freii* nur um eine *incanana*-Form handelt.

E. (E.) nevadensis (Rbl.) (Seite 191; als ein Synonym der *nervana*)
nevadensis REBEL, 1928, Zschr. Oesterr. Ent. Ver., vol. 13, p. 50 (*Cnephasia*); *nervana* (part.) OBRAZTSOV, 1956, Tijdschr. v. Ent., vol. 99, p. 123 (*Eana*). — RAZOWSKI, 1959, p. 293, t. 29 fig. 98—101, t. 51 fig. 238, t. 64 fig. 302 (Falter, ♂ ♀-Genitalien); 1959a, p. 85. — Spanien (Sierra Nevada).

E. (E.) joannisi (Schaw.) (Seite 189)
Nachtrag: RAZOWSKI, 1959, p. 293, t. 29 fig. 102, t. 52 fig. 239, t. 64 fig. 303 (Falter, ♂ ♀-Genitalien); 1961, p. 671, fig. 2 (Kopf).
ab. evisa Schaw. (Seite 190)

Die als *joannisi*-Unterart angeführte ssp. *dumonti* Réal ist eine gute Art (s. unten).

E. (E.) derivana (Lah.) (Seite 190)
Nachtrag: RAZOWSKI, 1957, p. 124, t. 16 fig. 1, t. 21 fig. 1, t. 24 fig. 4; 1959, p. 295,

t. 29 fig. 103, 104, t. 52 fig. 240, t. 65 fig. 304 (in beiden Arbeiten: Falter, ♂ ♀-Genitalien); Hannemann, 1961, p. 46, fig. 74 (♂-Genitalien); Sauter, 1961, p. 270, fig. 2 (♀-Genitalien).

E. (E.) incognitana Raz.
incognitana Razowski, 1959, Acta Zool. Cracov., vol. 4, p. 296, t. 30 fig. 105, t. 65 fig. 305 (Falter, ♀-Genitalien) (*Eana*). — Engadin.

E. (E.) jaeckhi Raz.
jäckhi Razowski, 1959, Acta Zool. Cracov., vol. 4, p. 297, t. 30 fig. 106, t. 65 fig. 306 (Falter, ♀-Genitalien) (*Eana*). — Frankreich (Rhône).

E. (E.) rundiapicana Raz.
rundiapicana Razowski, 1959, Acta Zool. Cracov., vol. 4, p. 297, t. 30 fig. 107, t. 65 fig. 307 (Falter, ♀-Genitalien) (*Eana*). — „Bomich".

Razowski (1959) erwähnt nicht, wo sich die angegebene Lokalität befindet. Auf Seite 348 transkribiert er den Namen als „Bomisch", was die Sache leider nicht aufklärt.

E. (E.) herzegovinae Raz.
herzegovinae Razowski, 1959, Acta Zool. Cracov., vol. 4, p. 238, t. 30 fig. 108, t. 65 fig. 308 (Falter, ♀-Genitalien) (*Eana*). — Herzegowina.

E. (E.) cyanescana (Réal) (Seite 190)
Nachtrag: *cianescana* (err.) Razowski, 1961, Bull. Mus. Nat. Hist. Nat., ser. 2, vol. 32, p. 531 (*Eana*). — Razowski, 1959, p. 298, t. 30 fig. 109, 110, t. 52 fig. 241, t. 66 fig. 309 (Falter, ♂ ♀-Genitalien).

E. (E.) clercana (Joann.) (Seite 189)
Nachtrag: Razowski, 1959, p. 299, t. 30 fig. 111, t. 52 fig. 242, t. 66 fig. 310 (Falter, ♂ ♀-Genitalien).

E. (E.) samarcandae Raz.
samarcandae Razowski, 1958, Acta Zool. Cracov., vol. 2, p. 568, t. 54 fig. 8, t. 57 fig. 33 (Falter, ♂-Genitalien) (*Eana*). — Samarkand.

E. (E.) pallifrons Raz.
pallifrons Razowski, 1958, Acta Zool. Cracov., vol. 2, p. 569, t. 54 fig. 9, t. 57 fig. 34 (Falter, ♂-Genitalien) (*Eana*). — Mongolei.

E. (E.) viardi (Réal) (Seite 190)
Nachtrag: Razowski, 1959, p. 301, t. 30 fig. 112, t. 53 fig. 243, t. 66 fig. 312 (Falter, ♂ ♀-Genitalien); 1961b, p. 531.

E. (E.) dumonti (Réal) (Seite 190; als *E. joannisi* ssp.)
dumonti Réal, 1953, Bull. Mens. Soc. Linn. Lyon, vol. 22, p. 53, fig. 1 (♂-Genitalien) (*Cnephasia, Nephodesme*); *legrandi* Réal, 1953, ibid., p. 53, fig. 3 (♂-Genitalien) (*Cnephasia, Nephodesme*); *dummonti* (err. typogr.) Razowski, 1961, Acta Zool. Cracov., vol. 5, p. 672 (*Eana*). — Razowski, 1959, p. 300 (als *legrandi*; nicht t. 66 fig. 311); p. 294; 1961, p. 671, fig. 1 (Kopf); 1961b, p. 531. — Südfrankreich.

Nach Razowski (1961) gehört der Allotypus von *legrandi* (Réal, 1953, fig. 4; Razowski, 1959, t. 66 fig. 311; Weibchen) zu einer unbeschriebenen *Eana*-Art.

Species incertae sedis

E. agricolana (Kenn.) (Seite 191)

E. antiphila (Meyr.) (Seite 191)

E. biruptana (Chrét.) (Seite 189)

E. dominicana (Kenn.) (Seite 191)

E. stenoptera Fil.
stenoptera FILIPJEV, 1962, Trudy Zool. Inst. Akad. Nauk SSSR, vol. 30, p. 381, fig. 22 (♂-Genitalien) (*Eana*). — Südussuri; Amur.

Obwohl die Originalbeschreibung dieser Art ziemlich ausführlich ist, gibt sie keine genügende Stützpunkte um *stenoptera* in die Gattung *Eana* mit Sicherheit einzureihen. Der Autor vergleicht sie mit „*Eana*" *wertheimsteini* Rbl., die in der Tat zu *Oxypteron* Stgr. gehört. Dieser Umstand veranläßt uns zur Vermutung, daß der Autor der *stenoptera* das Geäder weder bei dieser Art noch bei *wertheimsteini* untersuchte. Die abgebildeten männlichen Genitalien der *stenoptera* sind keiner bekannten *Eana*-Art ähnlich; ebenso wenig erinnern sie an solche der *Oxypteron*-Arten, bei welchen der Gnathos weichhäutig ist. Es scheint deshalb durchaus möglich, daß *stenoptera* irgendeiner noch unbeschriebenen Gattung angehört, deren Aufstellung ohne Untersuchung des betreffenden Materials vorläufig unmöglich ist.

E. tibetana (Car.) comb. nova (Seite 187)

E. vetulana (Chr.) comb. nova (Seite 180)

Die beiden letztgenannten Arten sind auf Grund brieflicher Mitteilung des Herrn J. RAZOWSKI in die Gattung *Eana* eingereiht.

Gattung **Doloploca** Hb., 1825 (Seiten 119, 192)

Die in meinem Kataloge als *Doloploca*-Arten angeführten *lineata* Wlsm. und *schawerdai* Rbl. gehören: die erstere zur *Cnephasia* Curt., die zweite zur *Oxypteron* Stgr.

D. punctulana (Schiff.) (Seite 192)
Nachtrag: RAZOWSKI, 1957, p. 119, t. 14 fig. 2, t. 19 fig. 4, t. 23 fig. 2; 1959, p. 304, t. 31 fig. 113, 114, t. 53 fig. 244, t. 67 fig. 313 (in beiden Arbeiten: Falter, ♂ ♀-Genitalien); SWATSCHEK, 1958, p. 63, fig. 64 (Larvalmorphologie); HANNEMANN, 1961, p. 46, fig. 75—75b, t. 4 fig. 14 (Falter, Kopf, Geäder, ♂-Genitalien).

D. (?) **buraetica** Stgr. (Seite 192)

D. (?) **characterana** Snell. (Seite 192)

D. (?) **praeviella** (Ersch.) (Seite 192)

Gattung **Eulederereria** Fern., 1908 (Seiten 121, 192)

E. alpicolana (Fröl.) (Seite 192)
Nachtrag: RAZOWSKI, 1959, p. 310, t. 31 fig. 120, t. 32 fig. 121, t. 54 fig. 247, t. 67 fig. 316 (Falter, ♂ ♀-Genitalien); HANNEMANN, 1961, p. 48, fig. 76—76b, t. 1 fig. 13 (Falter, Kopf, Geäder, ♂-Genitalien).

ab. **lugubrana** Della-Beffa (Seite 192)
Nachtrag: RAZOWSKI, 1959, p. 310.

Gattung **Trachysmia** Gn., (Seiten 123, 192)

T. rigana (Sod.) (Seite 192)
Nachtrag: RAZOWSKI, 1957, p. 119, t. 14 fig. 1, t. 19 fig. 3, t. 23 fig. 1; 1959, p. 313, t. 32 fig. 122—124, t. 54 fig. 248, t. 67 fig. 317 (in beiden Arbeiten: Falter, ♂♀-Genitalien); SWATSCHEK, 1958, p. 67 (Larvalmorphologie); HANNEMANN, 1961, p. 48, fig. 77—77b, t. 5 fig. 2 (Falter, Kopf, Geäder, ♂-Genitalien).
m. alt. **monticolana** Frey (Seite 192)
Nachtrag: *monticola* (err.) RAZOWSKI, 1959, p. 313 (*Trachysmia*).
ab. **caeca** Réal (Seite 193)
Nachtrag: RAZOWSKI, 1959, p. 314; 1961b, p. 532.

LITERATUR[1])

AMSEL, H. G., 1958. "Cyprische Kleinschmetterlinge (Schluss)." Zschr. Wien. Ent. Ges., vol. 43, pp. 69—75.

CHAPMAN, T. A., 1907. "Note on the life-history of *Tortricodes chapmani* Wlsm." Ent. Mo. Mag., vol. 43, p. 210.

CLARKE, J. F. Gates, 1958. Catalogue of the type specimens of Microlepidoptera in the British Museum (Natural History) described by Edward Meyrick. Vol. 3. London, 2 + 600 pp. (298 tt. incl.).

DANILEVSKY, A. S., 1963. "New species of leaf-rollers (Lepidoptera, Tortricidae) of the Palaearctic fauna." Rev. Ent. URSS, vol. 42, pp. 164—177.

FILIPJEV, N. N., 1962. "New species of Tortricinae (Lepidoptera, Tortricidae) in the fauna of the USSR." Trudy Zool. Inst. Akad. Nauk SSSR, vol. 30, pp. 369—381.

HANNEMANN, H. J., 1961. Kleinschmetterlinge oder Microlepidoptera. I. Die Wickler (s. str.) (Tortricidae). In: DAHL, F. & H. BISCHOFF, Die Tierwelt Deutschlands, pars 48, Jena, 11 + 233 pp., 22 tt.

International Code of Zoological Nomenclature adopted by the XV International Congress of Zoology. London, 1961, 18 + 176 pp.

ISSIKI, S., 1957. Eucosmidae & Tortricidae. In: Icones Heterocerorum Japonicorum in coloribus naturalibus, [vol. 1], pp. 53—86, tt. 8—16.

KAWABE, A., 1963. "A revision of the genus *Tortricodes*." Tinea, vol. 6, pp. 5—8, t. 3.

KUZNETZOV, V. I., 1962. In: DANILEVSKY, A. S., KUZNETZOV, V. I. & FALKOVITSH, M. I., "Listovertki (Lepidoptera, Tortricidae) gornych rajonov Juzhnogo Kazakhstana." Trudy Inst. Zool. Akad. Nauk Kazakh. SSR, vol. 18, pp. 100—102.

MACKAY, M. R., 1959. Larvae of the North American Olethreutidae. Canad. Ent., vol. 91, suppl. 10, 338 pp.

MACKAY, M. R., 1962. Larvae of the North American Tortricinae. Ibid., suppl. 28, 182 pp.

OBRAZTSOV, N. S., 1954, 1955, 1956, 1957. „Die Gattungen der palaearktischen Tortricidae. I. Allgemeine Aufteilung der Familie und die Unterfamilien Tortricinae und Sparganothinae." Tijdschr. v. Ent., vol. 97, 1954, pp. 141—231; vol. 98, 1955, pp. 147—228; vol. 99, 1956, pp. 107—154; vol. 100, 1957, pp. 309—347.

OBRAZTSOV, N. S., 1963. "North American species of the genus *Eana*, with a general review of the genus, and descriptions of two new species." J. Lep. Soc., vol. 16, pp. 175—192.

OKANO, M., 1959. Olethreutidae & Tortricidae. In: Iconographia Insectorum Japonicorum colore naturali edita, vol. 1 (Lepidoptera). Tokyo, pp. 259—268, tt. 174—178.

RAZOWSKI, J., 1956. "Two new Palearctic species of the genus *Cnephasia* Curt." Acta Zool. Cracov., vol. 1, pp. 21—29 (tt. 3—5 incl.).

[1]) Nachtrag zum Literaturverzeichnis; s. 1.Abteilung der Revision, Seiten 337—345.

RAZOWSKI, J., 1956a. „Eine neue Art *Tortricodes* Guen. und Bemerkungen über zwei von Filipjev aus der Gattung *Cnephasia* Curtis beschriebene Arten." Zschr. Wien. Ent. Ges., vol. 41, pp. 204—208, t. 20.

RAZOWSKI, J., 1957. "Cnephasiinae of Poland." Acta Zool. Cracov., vol. 1, pp. 117—159 (tt. 14—26 incl.).

RAZOWSKI, J., 1957a. "Polish species of the subfamily Tortricinae." Polsk. Pismo Ent., vol. 26, pp. 135—154, tt. 1—5.

RAZOWSKI, J., 1957b. „Neue Wickler-Arten aus der Sammlung Amsel." Beitr. naturk. Forsch. Südwestdtschl., vol. 16, pp. 101—104, t. 2.

RAZOWSKI, J., 1958. "Remarks on the species of the subgenus *Brachycnephasia* Réal and a new species of the subgenus *Cnephasia* s. s." Polsk. Pismo Ent., vol. 27, pp. 75—84, tt. 1—8.

RAZOWSKI, J., 1958a. "New and little known Palaearctic species of the genus Cnephasiini [sic!]." Acta Zool. Cracov., vol. 2, pp. 560—605 (tt. 53—62 incl.).

RAZOWSKI, J., 1959. "European species of Cnephasiini." Ibidem, vol. 4, pp. 179—423 (tt. 17—67 incl.).

RAZOWSKI, J., 1959a. „Neue und wenig bekannte palaearktische Wickler-Arten." Zschr. Wien. Ent. Ges., vol. 44, p. 81—87, tt. 2—3.

RAZOWSKI, J., 1961. "Notes on some little known Tortricidae." Acta Zool. Cracov., vol. 5, pp. 661—697 (tt. 86—93 incl.).

RAZOWSKI, J., 1961a. "Studies on Cochylidae. Part IV. New and little known Palaearctic Cochylidae." Ibidem, vol. 6, pp. 1—8, tt. 1—5.

RAZOWSKI, J., 1961b. „Étude des types de tordeuses de MM. D. Lucas et P. Réal." Bull. Mus. Nat. Hist. Nat. (Paris), sér. 2, vol. 32, pp. 528—535.

RAZOWSKI, J., 1961c. "Two new species and one new subspecies of the genus *Cnephasia* Curt." Polsk. Pismo Ent., vol. 31, pp. 105—107.

SAUTER, W., 1961. „Ueber einige von J. C. De La Harpe, J. Müller-Rutz und P. Weber aus der Schweiz beschriebene Kleinschmetterlinge." Mitt. Schweiz. Ent. Ges., vol. 33, pp. 264—274.

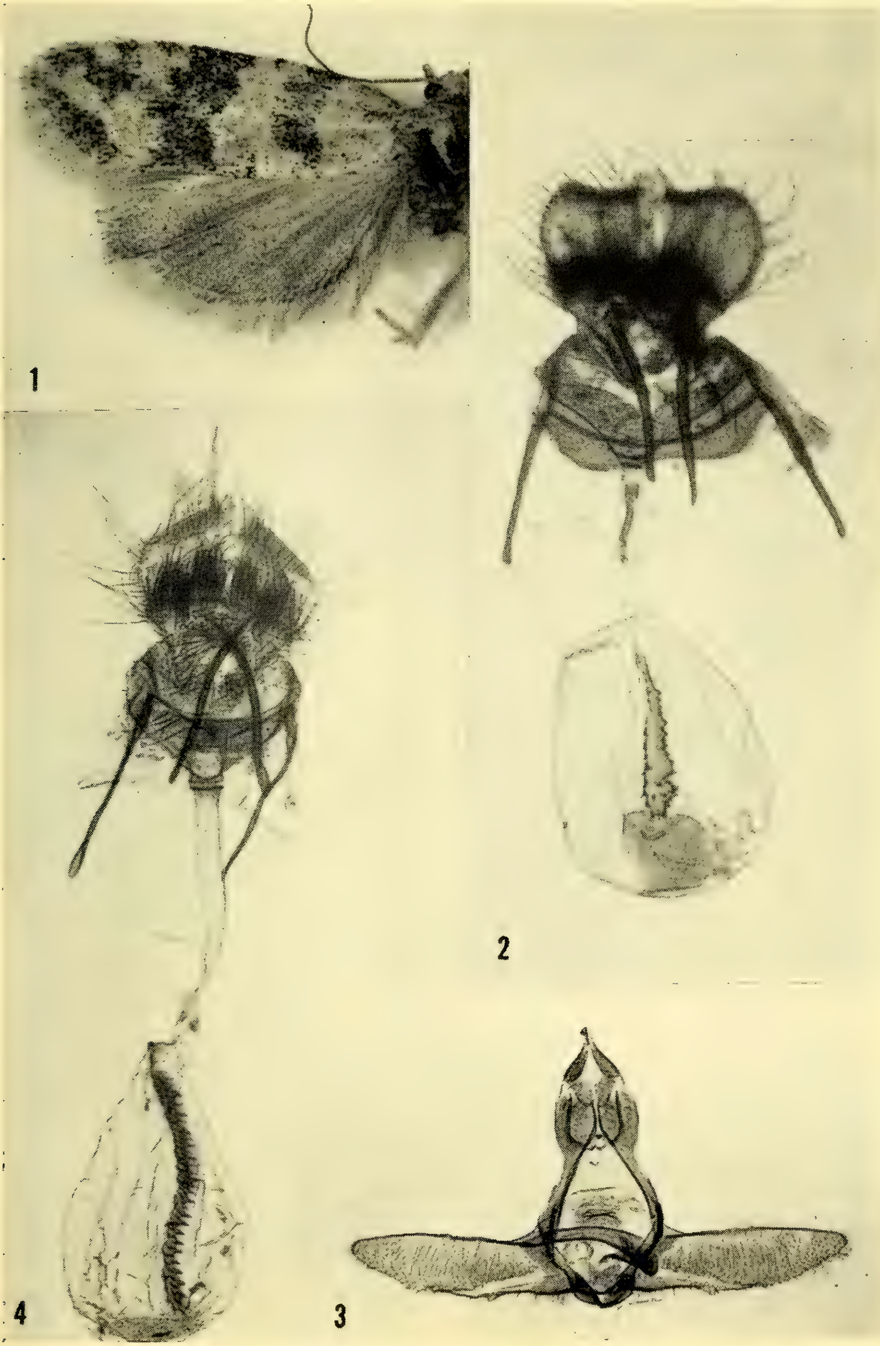
STAUDINGER, O. & H. REBEL, 1901. Sieh: REBEL, 1901.

SWATSCHEK, B., 1958. Die Larvalsystematik der Wickler. Abh. Larvalsyst. Ins., No. 3, Berlin, 269 pp.

TREITSCHKE, F., 1832. Die Schmetterlinge von Europa. Leipzig. Vol. 9, pars 1, 8 + 272 pp.

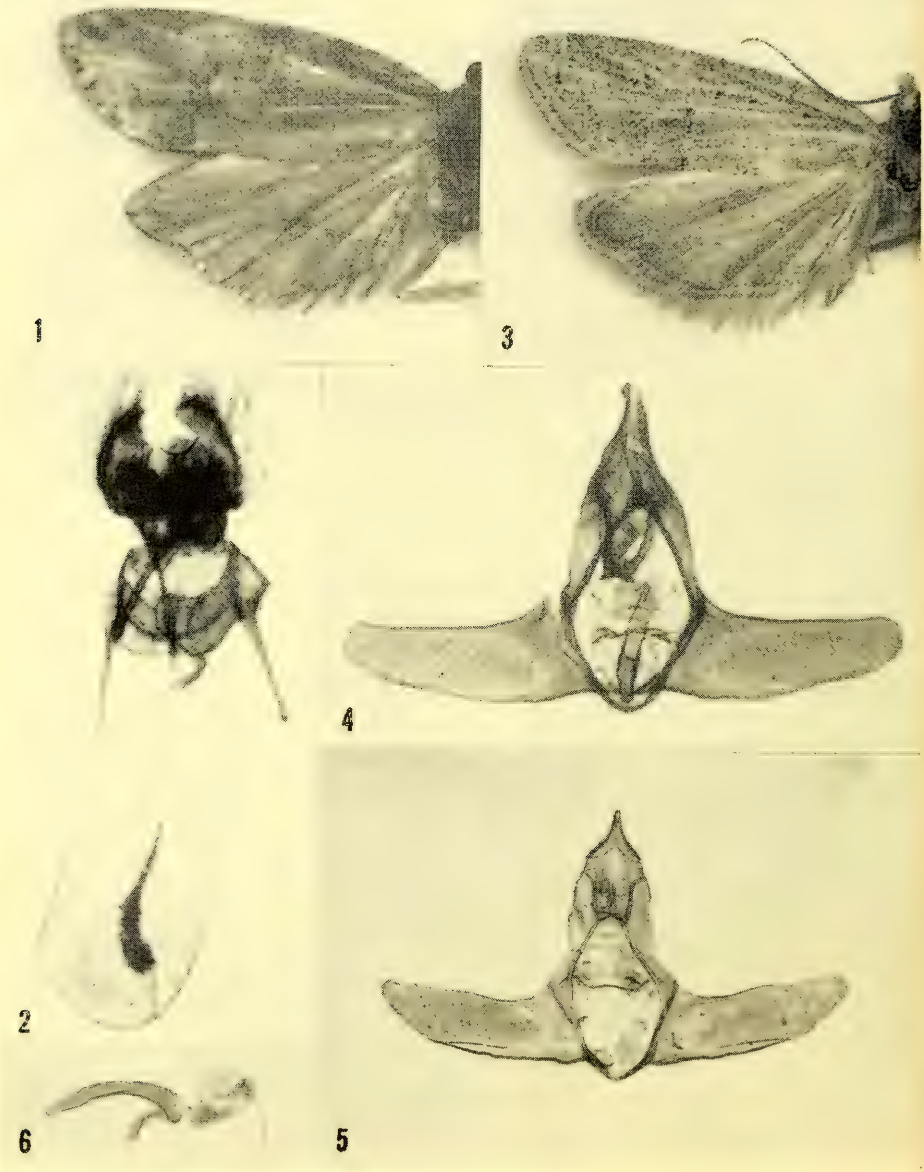
WALSINGHAM, Lord, 1907. "Algerian Microlepidoptera (cont.)." Ent. Mo. Mag., vol. 43, pp. 187—195.

YASUDA, T., 1962. "A study of the Japanese Tortricidae (1)." Publ. Ent. Lab. Univ. Osaka Pref., No. 7, pp. 49—55, t. 1.



Tafel 1. *Cnephasia*-Arten. 1. *C. tristrami* (Wlsm.), Weibchen; Lectotypus. 2. Idem, Genitalien. 3. Idem, männliche Genitalien (Ain Karin, Jerusalem, Palästina, 15. April 1931; Foto von Dr. E. JÄCKH). 4. *C. adulterinana* (Kenn.), weibliche Genitalien; Holotypus

N. S. OBRAZTSOV : *Die Gattungen der Palaearctischen Tortricidae*



Tafel 2. *Cnephasia*-Arten. 1. *C. stolidana* (Wkr.), Weibchen; Holotypus. 2. Idem, Genitalien. 3. *C. lineata* (Wlsm.), Männchen; Holotypus. 4. Idem, Genitalien. 5. *C. grandis* (Osth.), Paratypus; männliche Genitalien (Särdab-Tal, Vandarban, N. Persien; Z.S.M.). 6. Idem, Aedoeagus

N. S. OBRAZTSOV : *Die Gattungen der Palaearctischen Tortricidae*

Tafel 3. Cnephasiini-Arten. 1. *Cnephasia fragosana* (Z.), Männchen; Lectotypus. 2. Idem, Genitalien. 3. *Cnephasiella incertana* (Tr.), Männchen; Lectotypus der *barbarana* Wlsm. 4. Idem, Genitalien. 5. *Oxypteron eremicum* (Wlsm.), Männchen; Holotypus. 6. Idem, Genitalien. 7. Idem, Aedoeagus. 8. *Kawabeia ignavana* (Chr.), Holotypus; männliche Genitalien. 9. Idem, Aedoeagus

N. S. OBRAZTSOV : *Die Gattungen der Palaearctischen Tortricidae*

Tafel 4. *Oxypteron*-Arten. 1. *O. exiguanum* (Lah.), Lectotypus der *chapmani* Wlsm.; männliche Genitalien. 2. Idem, Aedoeagus. 3. Idem, Lectallotypus der *chapmani* Wlsm.; weibliche Genitalien. 4. *O. impar* Stgr., weibliche Genitalien (Präparat AB., 20. Oktober 1928; Europa; U.S.N.M.). 5. *O. politum* (Wlsm.), Männchen; Holotypus 6. Idem, Genitalien. 7. Idem, Aedoeagus

Entomologische Berichten

De *Entomologische Berichten* worden eveneens door de Nederlandsche Entomologische Vereeniging uitgegeven en zijn bestemd voor de publicatie van kortere artikelen, van faunistische notities etc., alsmede van de Verslagen der Vergaderingen en van mededelingen van het Bestuur. Zij verschijnen twaalf maal per jaar in een aflevering van 16 of meer bladzijden. Deze 12 afleveringen vormen samen een deel.

Trichopterorum Catalogus

De Trichopterorum Catalogus van F. C. J. Fischer wordt door de Nederlandsche Entomologische Vereeniging voor rekening van de auteur uitgegeven. De eerste vijf delen verschenen in 1960—1964. In totaal worden het 15 delen. Alle bekende recente en fossiele soorten van de gehele wereld met hun synoniemen worden er in behandeld. Van alle genera worden de type-soorten aangewezen en de literatuur zal van 1758 tot eind 1960 met de geografische verspreiding vermeld worden. Delen I en II kosten *f* 39,— per stuk, delen III—V: *f* 45,—. Van alle delen zijn ook éénzijdig bedrukte exemplaren beschikbaar. De prijsverhoging hiervoor bedraagt *f* 2,50.

Alle zakelijke correspondentie betreffende de Vereeniging te richten aan de Secretaris, W. Hellinga, Weesperzijde 23II, Amsterdam-O.

Alle correspondentie over de redactie van het Tijdschrift voor Entomologie te richten aan de Redacteur, Dr. A. Diakonoff, Rijksmuseum van Natuurlijke Historie, Leiden.

Alle correspondentie over de redactie van de Entomologische Berichten te richten aan de Redacteur, B. J. Lempke, Oude IJselstraat 12III, Amsterdam-Z. 2.

Alle betalingen te richten aan de Penningmeester, Drs. H. Wiering, Doorntjes 29, Bergen (N.H.), postgiro 188130, ten name van de Nederlandsche Entomologische Vereeniging te Bergen (N.H.).

Alle correspondentie betreffende de Bibliotheek der Vereeniging te richten aan de Bibliotheek, Zeeburgerdijk 21, Amsterdam-O.

Notice to Subscribers

All correspondence referring to subscriptions and exchange of the periodicals of the Netherlands Entomological Society should be addressed to the Librarian, Zeeburgerdijk 21, Amsterdam-O, Netherlands.

NOTICE TO CONTRIBUTORS

Contributors will receive free of charge fifty reprints of their papers, joint authors have to divide this number between them at their discretion. Additional reprints may be ordered when returning proofs.

Manuscripts should be written in Dutch, English, French, German or Italian. If they contain descriptions of new genera, species, etc., they should be in one of the four last mentioned languages.

The author should communicate with the editor before submitting his manuscript. He will enclose with manuscript a Synopsis (Abstract), styled according to recommendations of the UNESCO (style rules will be provided by the editor) and, if needed, a Summary. Papers in Dutch should contain an Abstract and/or a Summary in one of the four other languages.

Manuscripts should be typewritten in double spacing on only one side of the paper, with a margin of at least three cm at the left side of each sheet. Paragraphs should be indented. Carbon copies cannot be accepted, as handling makes them illegible.

Captions for text figures and plates should be written on a separate sheet in double spacing, numbered consecutively in arabic numerals; the use of a, b, c, or any other subdivision of the figure numbering should be avoided.

Drawings for reproduction should be on good paper in Indian ink, preferably at least one and a half times as large as the ultimate size desired. Lettering should be uniform, and, after reduction, of the same size. Photographs should be furnished as shiny positive prints, unmounted. Plates should be arranged so as to fill a whole page (11.5 x 19 cm) of the *Tijdschrift,* or a portion thereof, captions included. Combinations of illustrations into groups are preferable to separate illustrations, since there is a minimum charge per block.

Names of genera and lower systematic categories, new terms and the like are to be underlined by the author in the manuscript by a single straight line. Any other directions as to size or style of the type are given by the editors, not by the author. Italic type or spacing to stress ordinary words or sentences is to be avoided. Dates should be spelled as follows: either "10.V.1948" or "10 May, 1948". Other use of latin numerals should be avoided, as well as abbreviations in the text, save those generally accepted. Numbers from one to ten occurring in the text should be written in full, one, two, three, etc. Titles must be kept short. Footnotes should be kept at a minimum.

Bibliography should no be given in footnotes but compiled in a list at the end of the paper, styled as follows:

Mosley, M. E., 1932, "A revision of the European species of the genus *Leuctra* (Plecoptera)". — Ann. Mag. Nat. Hist. [10] 10 (3): 1—41, pl. 1—5, fig. 1—57. Number of issue should only be added (in parentheses) when it has individual pagination.

Text references to this list might be made thus:

"Mosley (1932) says...." or "(Mosley, 1932)".

The editors reserve the right to adjust style to certain standards of uniformity.

Manuscripts and all communications concerning editorial matters only should be sent to: Dr. A. Diakonoff, Rijksmuseum van Natuurlijke Historie, Leiden, The Netherlands.

DEEL 108 AFLEVERING 2 1965

TIJDSCHRIFT VOOR ENTOMOLOGIE

UITGEGEVEN DOOR

DE NEDERLANDSCHE ENTOMOLOGISCHE VEREENIGING

INHOUD:

Tijdschrift voor Entomologie, deel 108, afl. 2. Gepubliceerd 16-IV-1965

Nederlandsche Entomologische Vereeniging

De contributie voor het lidmaatschap bedraagt f 15.—, voor student-leden f 2.50, per jaar. — Begunstigers betalen jaarlijks tenminste f 15.—.

De leden, behalve de student-leden, ontvangen gratis de *Entomologische Berichten* van 12 nummers per jaar, waarvan de prijs voor student-leden f 1.50 per jaar, voor niet-leden f 20.— per jaar en f 2.— per nummer bedraagt.

De leden kunnen zich voor f 10.— per jaar abonneren op het *Tijdschrift voor Entomologie;* hiervan bedraagt de prijs voor niet-leden f 35.— per jaar.

De eerder verschenen publicaties der Vereeniging zijn voor de leden tegen verminderde prijzen verkrijgbaar.

Tijdschrift voor Entomologie

Het *Tijdschrift voor Entomologie* wordt uitgegeven door de Nederlandsche Entomologische Vereeniging en is bestemd voor de publicatie van de resultaten van de studie der Entomologie van algemene en bijzondere aard. Het verschijnt in één deel van 300—400 bladzijden per jaar, bestaande uit enkele afleveringen. Bovendien worden monographieën handelende over bijzondere onderwerpen, met onregelmatige tussenpozen uitgegeven.

MACROMIA SPLENDENS (PICTET, 1843) IN EUROPE WITH NOTES ON ITS HABITS, LARVA, AND DISTRIBUTION (ODONATA)

BY

M. A. LIEFTINCK

Rijksmuseum voor Natuurlijke Historie, Leiden

Abstract

A survey is given of the morphology and biology of a large stream-inhabiting Corduliid, the only known representative of its genus in Europe. The history is briefly outlined and the distributional data reviewed. An itinerary relates to two excursions in southern France made in June, 1961 and 1964. New localities are described and field observations are supplied on the flight habits and behaviour. Oviposition was observed twice, but the early larval stages have remained unknown. The taxonomic part contains colour notes as well as illustrations of the hitherto undescribed genital organs and leg structure of the male. An account is given of the larval structures and accompanied by a photograph of the exuvia. The known facts concerning habitat requirements, adaptive features, larval development and life-history of *Macromia* in general are summarized and the relationship of *M. splendens* with other members discussed. The geographical distribution of the insect in south-western Europe is compared with that of its nearest allies of eastern Asia and North America. Most of the localities in France and Portugal are verified and a distribution map is included. The occurrence of the insect in Spain, though not called in question, remains to be re-established.

Since the physiographical and physiological requirements of the larva are closely correlated with a life in slow-flowing streams, it is suggested that *M. splendens* can survive only in low country, with mild climatic conditions prevailing during most of the year. This may explain its restricted and scattered occurrence in the warm river systems of south-western Europe, where it is supposed to have maintained itself as a remnant of a once much richer preglacial fauna. The main factors which are considered derogatory to the insect's survival are explained in connection with the possibility of extinction through over-collecting, a danger easily to be avoided by thoughtful naturalists.

Introduction

This paper is an attempt to bring up to date our knowledge of *Macromia splendens* (Pictet), a conspicuous dragonfly of great size and beauty, which in 1871 was named 'la Macromie éclatante' by the Baron E. de Selys Longchamps. It is the only European component of a large genus of Corduliidae, a unit of almost world-wide distribution, which takes rather an isolated position both in regard to its morphology and occurrence.

Perhaps the main stimulus to the present account has been furnished by the late K. J. Morton, who almost forty years ago wrote a concise and interesting article on this insect, a paper also containing a pleasantly composed narrative of his own experiences with it in the field. It will be unnecessary to enter upon the historical part of the subject as this has been fully dealt with in Morton's introduction from the time of its original description to the date of writing (1925). Subsequent

information has been very scanty with the exception, of course, of the important article published by GRASSÉ (1930), who for the first time gave a description and some illustrations of the larva.

When I had the opportunity, in August 1960, of meeting my friend C. NIELSEN, of Bologna, at the XI. Congress of Entomology in Vienna, we determined to make a joint effort, at some future data, to rediscover *M. splendens* in its natural habitation. During the summer of 1961 I first met with the insect myself in southern France, but it was only after a lapse of two more seasons that both of us succeeded to make a more intimate acquaintance with it. Some of our observations on this subject may be worth putting on record and might be found useful: it is our hope that some of our fellow workers in the south may have the opportunity to fill the remaining gaps in our knowledge of the life history of *M. splendens.* Thus I propose here to give a brief summary of what we learned about it, prefaced by some earlier observations and followed by additional descriptions and notes on the relationship and distribution of this fascinating insect.

STRAY NOTES ON AN EXCURSION IN 1961

While journeying through several of the southern provinces of France in June, 1961 and 1962, I had kept a good look-out for *M. splendens.* The most noticeable event of the first excursion was undoubtedly the rediscovery of our insect near a well-known locality in the département Lot, where MORTON had found it almost forty years previously. On 18th June, 1962, I saw a male at the Vis, near a village called Montmal near Ganges (Gard), but since the insect was not especially worked for, this second trip remained unsuccessful. The next brief itinerary shows the result of the earlier excursion.

About noon of 20th June, 1961, we reached Larroque-des-Arcs, a small village about 5 km east of Cahors at the right bank of the river Lot, where we stayed. The Lot is of course the largest river in the Quercy district and its channel, except when in flood, is usually about 90—100 metres broad. It has turbid water and a slow flow. By the time we arrived no Odonata were seen over the quiet water, but my attention was soon attracted by the noisy behaviour of several Grey Wagtails (*Motacilla cinerea*) tripping about close to the water's edge. A quick search of the small mud flats near the hotel gave the clue to this activity, for glittering patches of wings of freshly emerged dragonflies were scattered over the surface all along the bank. Within a few minutes I picked up a score of *Gomphus* spec. wings, five of *Oxygastra curtisi* and twelve (8 fore and 4 hind wings) of *Macromia splendens.* I have no doubt that these birds here were particularly destructive to the teneral dragonflies emerging and had consumed a high percentage of them. The part of the river on which these adult fragments and larval skins occurred in such profusion is most ordinary in appearance, with no aquatic plants growing in it. Here the Lot flows leisurely through arable land, neglected gardens, etc., and only a narrow fringe of trees and shrubbery grows on its banks.[1]) Early next morning the same stretch was again investigated, mainly for exuviae, but apart

[1]) A good impression of this site can be obtained from the photographic illustration in the Guide Vert Michelin "Périgord". (1ère édition, p. 120).

from some quite mature *Gomphus simillimus* and a few newly emerged *Gomphus graslini* settled close to the ground or beaten up from among wet grass under the bushes, no imagines of *Macromia* or *Oxygastra* were seen over the water. The *Gomphus* on their maiden flight all headed northwards away from the Lot, crossing the meadows and road, flying in a straight line towards the wooded hills about two hundred yards distant.

We left Larroque early the same morning for Décazeville, following the "route touristique" through the valley of the Lot.

Near Crégols, a charming little village on the left bank about 38 kilometres east of Cahors, a streamlet meandering through woodland branches off from the main river to join it again only half a mile further down. It is a shady stream with clear water flowing over thick deposits of coarse sand, alternating with silt and mud (or even pools in places) and has a luxuriant and varied aquatic vegetation. During summer most of its water is received from a fast flowing brook which comes down from the southern hills, but the debris and dead leaves accumulated between branches of overshadowing trees clearly indicated frequent floods giving rise to rather considerable changes of the water level. It was here, in the afternoon of 19th June, 1961, that I for the first time saw a *Macromia* flying high over the road at some distance from the stream. We returned to the spot on the morning of the 21st and halted for a good search. Only three or four times, with long intervals, a solitary male flew past, and in two and a half hours I had managed to capture only two. They were extremely swift, coursing almost 6 feet high over the middle of the stream. Apart from *Oxygastra curtisi* and the two southern *Platycnemis*, a third species of the latter genus, *P. pennipes,* shared the others. *Calopteryx* was represented by *C. virgo*, and *Cordulegaster boltoni* — which was fairly common — occurred in a small-spotted form very nearly approaching the typical subspecies. Besides *Onychogomphus forcipatus,* also *Gomphus vulgatissimus* (not noted elsewhere) was present. The composite character of the dragonfly fauna met with here strongly suggested a mean temperature of the water much lower than in the open valley of the Lot.

Itinerary of a joint collecting trip in June, 1964

The aspect that chiefly interested us was the question where to find the breeding sites of *M. splendens.* Also, how to obtain its larva and what would be our chances of capturing a female and keep it alive for eggs. It must be said at the outset that our efforts were only partly rewarded, for although we got a series of males and found some perfect exuviae, a diligent search for a mature female to work out the entire life history remained without success.

Much had to be compressed into a very short space of time (four days in the field), so that we had to make up our minds beforehand as to the most promising spots and the routes to be followed. The valley of the Gardon, with Remoulins and the Pont du Gard area, looked attractive enough as a starting point, the more so since MORTON (1925) reports having twice seen a glimpse of *Macromia* at the Gardon, near the famous aqueduct. We spent part of the sunny, though much too cool, morning of the 25th June at the river but failed to see any. Let alone

other species occurring here, only the presence of many *Sympetrum striolatum* and *Aeshna affinis,* all still more or less immature, seems worth mentioning. Before leaving, two stages of very young gomphid larvae as well as mature ones of *Platycnemis acutipennis* and *Coenagrion* spec. were dredged up from scanty aquatic vegetation and fine sand on the left bank. We then went on via Uzès in a southwesterly direction towards Montpellier, collecting en route. Although the hilly garrigues are very arid and barren-looking in most places, we came across two tributary streams of the Gardon, both flowing through marshy land. One of these is the Bourdic, near Aubussargues, the other and more varied one the Crieulon, near Quissac, where we found dragonflies very plentiful and rich in species. The greatest variety we met with at the Crieulon, where we spent the rest of the day and the following morning. Above the dam this stream has wide marshy spots of some extent with a quiet flow, but also shady tracts with clear fast running water over rocky ground. Amongst the many other Odonata occurring here, the most noteworthy — though not the most conspicuous ones — were *Cordulegaster boltoni immaculifrons,* both sexes fairly common, also females ovipositing; *Boyeria irene,* several males not quite matured as well as some exuviae; *Gomphus graslini, simillimus, pulchellus,* and *vulgatissimus,* the first also taken in cop. and outnumbering the other species. Surprisingly, a pair of what I thought were *G. simillimus,* settling on the path, proved to be male *simillimus* copulating with female *vulgatissimus.* Although we were constantly on the look-out for *Macromia,* I saw it only twice: one male was observed flying swiftly along the path and a second (or same?) specimen, "hanging itself up" behind a pendent tuft of *Galium* under a bridge I missed at close quarters when it alighted.

The late afternoon of 25th June found us at the Source du Lez near Prades (Hérault), the classic locality both of *Macromia splendens* and *Cordulegaster boltoni immaculifrons.*[1]) To our regret we found the most promising spots at Prades fenced off and inaccessible, part of the surrounding wood being destroyed by the digging of a reservoir. Though no *Macromia* were seen, *Cordulegaster* was still abundant and we were fortunate enough to make detailed observations on its habits and oviposition, returning to Quissac in the evening.

The next morning, after satisfying ourselves that it was in vain to seek *splendens* any longer at the Crieulon, we decided to proceed to the Quercy area in the northwest part of southern France, a district comprising the river system of the Lot. This location, I reckoned, would probably mean our last chance to meet with *Macromia.* We past most of the day in driving, rain falling nearly all the way. We reached St. Géniez d'Olt, staying the night there, and in the morning of the 27th made for the locality at Crégols whence I had previously obtained a few *splendens* about the same time of the year. Here I found the topography and fauna unchanged, but owing to much rain during the past two or three days the water was high and uncomfortably cold. We spent many hours in the stream bed,

[1]) Being in Montpellier in the second week of April, 1961, in company with my friend and colleague Dr. C. O. VAN REGTEREN ALTENA, we visited the ground under the excellent guidance of Dr. A. BOURNIER, of the École Nationale d'Agriculture at Montpellier. On that occasion I for the first time learned the locality and found it was one well worth visiting later in the year.

exploring the surroundings thoroughly in all directions, yet failed to detect any *Macromia.* During the late afternoon and part of the evening we followed the river Lot as far down as Cahors, searching its banks in various places but to our great disappointment found MORTON's location near the town spoiled and the shore vegetation ruined.

In selecting nearby Larroque-des-Arcs as a starting point for further research I had again followed my itinerary of the summer of 1961, a course we had no cause to regret.

On 28th June we were up early and wishing to make the most of our opportunities we decided to have a look at the river first. It was a calm hazy morning and the surface of the water was smooth. The Lot was slightly higher in level than it was in the early summer of 1961, so we found it impossible to walk along its bank. With the exception of a single female of *Gomphus graslini* taken in transformation, we did not see any adult Anisoptera along the river edge, nor were there any predatory birds about. We took a boat and rowing slowly upstream investigated the right bank, looking for exuviae. Covering a stretch of no more than twenty yards in extent our search yielded scores of empty shucks of *Gomphus graslini* [1]) and *Oxygastra curtisi,* and if we had wished could easily have collected a hundred or more of the former. The emergence period of these species appeared to have ended already some time before our visit. While not altogether a matter of surprise, I had the good fortune of finding also four exuviae of *M. splendens*, one being attached underneath a landing-stage, a second on the trunk of an alder tree and the remainder adhering with sprawling legs to a weather-stained stone wall below the village. All skins were from 4—7 feet above the water at some distance from the river, and from their withered condition — in one even the head was lacking — it is evident that emergence must have taken place perhaps as much as two weeks earlier.

Not wishing to return to the scene of the previous day's failure, we left the Lot valley after a few hours and, heading towards Figeac, drove into the picturesque valley of the Celé, a strongly meandering tributary which has its source in the granitic hills of Cantal. It enters the Quercy district near Figeac and, breaking through a vast plateau of calcareous rock, continues its tortuous course in a southwesterly direction until running into the Lot above Bouziès. There is a drop in altitude of only thirty metres beginning at a location about fifteen kilometres away from its junction with the Lot, but as is the case with nearly all regional watercourses, there are so many weirs and small dams in its channel that the velocity of flow varies greatly.

The Celé was selected on account of its much smaller size and because of its lower reaches maintaining a moderate flow over a muddy bottom. Since this stream is bordered with trees and protected by high embankments, I also expected its immediate surroundings to be less disturbed by human agency.

---

[1]) Although adult mass emergence of *G. simillimus* in this area takes place somewhat earlier in the season than of *graslini, simillimus* too is a common species at the Lot. Yet I am unable to distinguish more than one species in my series of 34 exuviae (20 males, 14 females) collected at random. These agree closely with the skin of the transforming female of *G. graslini.*

We halted at a point near Liauzu, about 8 kilometres upstream, where the valley widened and the distant Celé followed a comparatively straight course. It could be reached from the north through gently sloping meadows at a place where its right bank is flanked by a dense growth of trees and shrubbery. On the opposite side the stream is well protected by hills rising steeply from the south.

We could scarcely have visited this place at a more favourable time. Much rain of the previous days had made the long grass very wet but soon the atmosphere became clear and the rainy weather gave way to ceaseless sunshine during the rest of the day.

Following the narrow tracks down to the steep mud bank, we fortunately found the border open to the sun. To our satisfaction the first *Macromia* was spotted almost immediately. Taking advantage of the tiny promontories used by trout fishermen, it was possible in some places to obtain a fairly secure footing close to the water's edge. We selected different positions at a point opposite a huge wall of solid rock that rose perpendicularly from the water. Here the stream was about 25 metres wide, quietly flowing (approximately 4 km/h near the surface), and carrying fairly deep water that was practically free from vegetation.

M. splendens was evidently at the height of its flying season (i.e., reproductive period) here, and from its habits we got the impression that the locality suited it exactly. Males were readily recognized at some distance, flying steadily up and down the river in regular and long beats. Occasionally one would cross the stream at a certain point in rapid pursuit of prey, but most of them kept to the bank, following the bends and promontories closely one foot or less above the surface. Often they rose, passing gently over more conspicuous obstacles like thickly leaved branches of overhanging trees. Males were over the dark water from the moment of our arrival (about 9.30 a.m.) until we decided to leave (1 p.m.). They became increasingly more numerous as time went on and we were able to collect a fair series. Around 11 a.m. each of us took a male that was followed so soon by a second flying in the same direction that we had no time to secure both. However, short interruptions frequently occurred when two males met and chased each other away, but as far as could be observed both rivals soon returned to the bank and resumed their beat. Clashes with other species occurred throughout the morning, mostly with *Gomphus simillimus* and *pulchellus,* which were seen to be chased away once and again when flying over open water. Frequent clashes also took place with *Oxygastra curtisi,* which was very common; however, males as well as ovipositing females of the latter kept low to the water's surface, usually coming out only in sunlit openings much closer to the bank and then apparently remained unnoticed. Territorial behaviour was not obvious as males continued to fly past fairly regularly in spite of our activities. Once I saw a male *splendens* in pursuit of a mature male of *Gomphus pulchellus,* and at the moment the victim was actually caught from below both were netted in one stroke.

Occasionally there were longer intervals between our captures. These pauses are most likely to be explained by females in the reproductive stage having arrived at the water: individuals of that sex on being seized by chasing males are immediately carried away into the trees. All *Macromia* seen by us had attained sexual maturity, and I estimated that they had been on the wing three weeks.

Oviposition was observed only twice, between 11 and 12 a.m. These were the only instances during which females were at all noticed close by; all the same, they remained beyond our reach on both occasions. The first individual was seen by Dr. NIELSEN who watched it flying upstream in a straight line, about a foot over open water, and forcibly tapping the surface with the end of its abdomen, four or five times at very short intervals. A second female I observed myself ovipositing in a similar way while hovering low down over vegetable debris lodged among dead branches projecting into the stream. It was noticed and disturbed almost instantly in rapid pursuit by a passing male, and I was unable to follow their course.

Exuviae here were not purposely sought for but with more time, perhaps, would not even have been found (see p. 53). However, I collected some empty skins of *Oxygastra* as well as one each of *Boyeria* and *Gomphus graslini,* from tree trunks near the water.

Since our collecting was mainly directed towards obtaining mating pairs or egg-laying females of *M. splendens* in the hope of procuring eggs for breeding purposes, we went on to explore other sections of the Celé during the afternoon. Neither at Marcilhac, however, nor at the bridge a few kilometres after Brengues (both upstream) did we see any more *Macromia.* Reluctantly we were compelled to give up and return home, leaving the sun behind us in the south. Thus, with the suggestion that we should again visit these favoured grounds to learn more in another season, our search for this year had come to an end.

TAXONOMY OF THE ADULT INSECT

Material. — Brussels Museum (Inst. Roy. Sci. Nat., coll. E. DE SELYS LONGCHAMPS): 1 ♀, labelled "Coll. Latreille"; 2 ♂ 2 ♀, "Charente, Delamain"; 2 ♂ 3 ♀ (1 ♀ juv.), "Mp" [Montpellier], 1 ♂ with additional note "fig. Gen. Ins." — British Museum: 1 ♂ 1 ♀, "Charente, Delamain" (ex coll. R. MACLACHLAN). — Leiden Museum: 1 ♂, "Charente, Delamain" (ex coll. DE SELYS); 1 ♂, "Montpellier, Meyer Dür" (ex coll. H. ALBARDA); 1 ♂, Gallia mer., Cahors (Lot), 3.vii.1931, K. J. MORTON (ex coll. M. A. LIEFTINCK); 2 ♂, Gallia mer., Crégols (Lot), 21.vi.1961, M. A. LIEFTINCK (1 ♂ in coll. C. NIELSEN). Leiden Mus. & coll. C. NIELSEN: series ♂, Gallia mer., Liauzu, Celé river (Lot), 29.vi. 1964, M. A. LIEFTINCK & C. NIELSEN; 4 exuviae, Gallia mer., Larroque-des-Arcs (Lot), 28.vi.1964, same collectors. — Coll. Ent., Serv. Florest., Lisbon: 1 ♂, Portugal, Soure, 1—15.vi.1922, A. F. DE SEABRA, labelled "Soure (print) 1-15-6°-922-1185".

In addition to the above, I have had the opportunity, in July 1964, to see the series of *M. splendens* in the MORTON collection that were shown to me by Mr. A. R. WATERSTON, Curator at the Royal Scottish Museum, Edinburgh. Lastly, Dr. K. H. BUCHHOLZ in Bonn wrote me that the species is represented in the collection of the Museum Koenig by a pair from "Charente, Delamain" (ex coll. OBERTHÜR).

Messrs. C. BESUCHET and H. GISIN, whom I had asked to search for the type of *M. splendens* in the collection of the Museum d'Histoire Naturelle at Geneva,

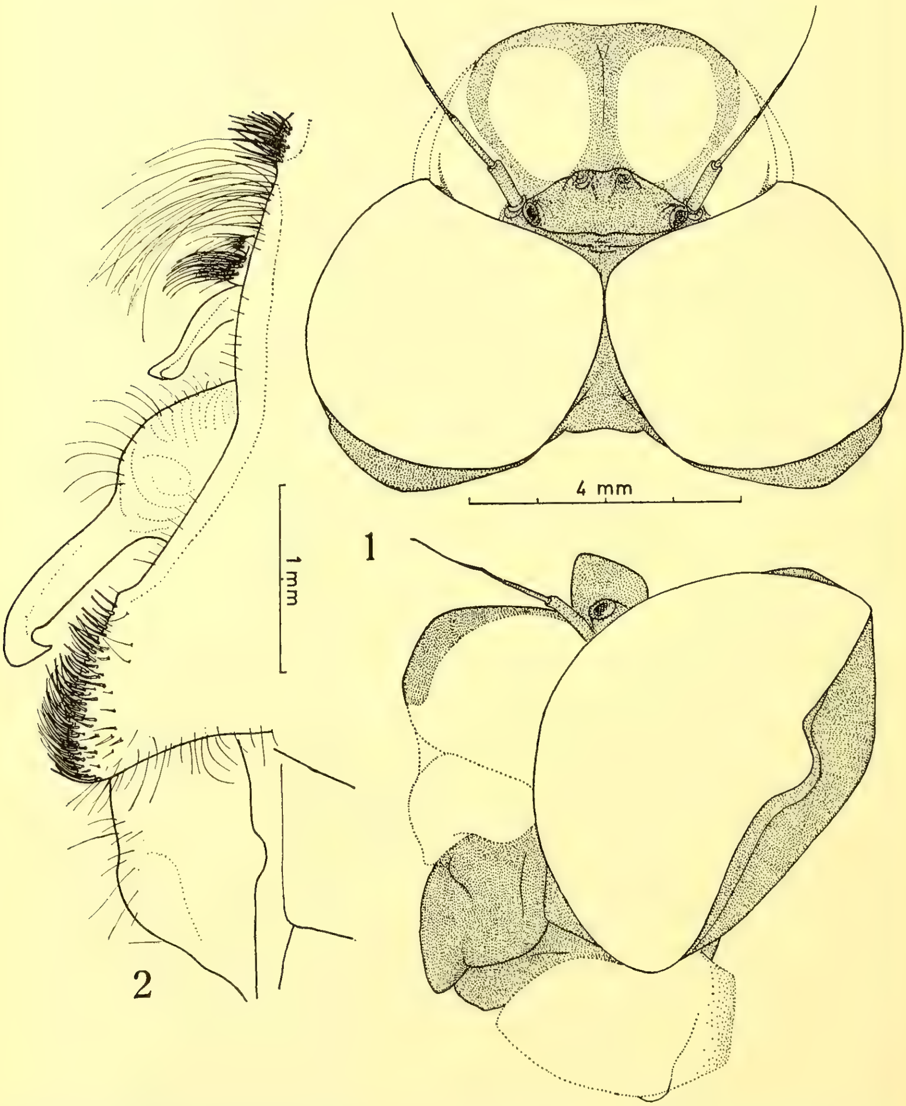


Fig. 1—2. *Macromia splendens* Pictet, ♂ from Crégols (Lot); 1, dorsal and left lateral view of head, showing colour-pattern; 2, left lateral view of genitalia

kindly informed me in a letter that the specimen could not be recovered. Unless the female originating from LATREILLE's collection in the Brussels Museum should prove to be PICTET's specimen, which is not unlikely, the type must be considered lost.

The salient characteristics of colour and pattern are found in the published descriptions (SELYS & HAGEN, 1850; SELYS, 1871). Two coloured illustrations of the whole insect exist in the literature. The first (and best), executed by PRÊTRE, is of the type female and accompanies PICTET's account of the species (1843b). A second, rather crude one, of a male, was given by MARTIN in the Cordulinae volume of the Genera Insectorum (1914). Good drawings of the principal venational characteristics are found in DE SEABRA's paper (1937), which also contains an excellent figure of the anal appendages, all taken from a Portuguese individual. Lastly, a female *M. splendens* caught near Montpellier was recently photographed by RENOUST (1961).

The following morphological details are given in addition to those published earlier.

A feature first attracting attention is the strongly protruding frons, the upper surface of which has well-pronounced lateral ridges. This dorsal part is longitudinally sulcate anteriorly and the two halves on each side of the floor are hollowed out, meeting at an obtuse angle (not shown in the figure 1). The deep black, very feebly metallic, frontal marks are coarsely striato-punctate, while the yellow dorsal patches have an irregularly wrinkled surface.

Male. — Length of posterior femur 12.8—13.2 mm, of anterior tibia 8.2—8.3 mm, of posterior tibia 12.5—13.0 mm; tibia keels yellow, present on distal 40.6% of anterior pair and 80% of posterior pair, but absent on intermediate tibiae. Lateral margin of abdominal tergite 2 with a bunch of strong, closely set, recurved black bristles at extreme base; inner border of genital lobe similarly bristled. Genital organs not prominent, apex of posterior hamule often concealed from view in lateral aspect. Dorsal plate of second penile segment exposed and of large size, shaped like a broad, outwardly convex, almost circularly curled ribbon, the apex of which is widest and truncated; in lateral aspect it is narrow, weakly S-shaped. Basal part of posterior hamule greatly swollen, then suddenly narrowed, cylindrical, at first gently incurved, then again somewhat outcurved, apex slightly twisted ending abruptly in an acute, feebly inwardly directed, recurved tooth (fig. 2).

Wing-membrane hyaline, veins including costa black; membranula white. All triangles and internal triangles uncrossed. Cross-veins in hypertriangles variable, 3—6 (usually 3—4) in fore wing, invariably 2 (not counting internal triangle) in hind wing. Anal loop consisting of 5—9 cells, only occasionally with a central cell. Pterostigma black.

The abdominal segments 4—6 are black; 4 is marked with a pair of small mid-dorsal yellow spots in front of the transverse carina, these spots occasionally being enlarged so as to become confluent posteriorly; 5 usually bears a pair of minute spots placed similarly, but these are wanting in 3 out of 8 freshly captured specimens; segment 6 is unmarked in all individuals examined.

Measurements (14 males, southern France): abd. + app. 52.0—54.5 mm, hind wing 44.5—46.0 mm; pterostigma fore wing 2.3—3.0 mm, pt. hind wing 2.4—3.0 mm.

The Portuguese male from Soure seems to be the only authentic specimen existing in collections of that country. This individual is still in perfect condition, the yellow abdominal markings only being somewhat discoloured. It differs in no way from French specimens. The hypertriangles have a single cross-vein in all wings, the cubital area is traversed by 3 nervures in the fore wings and 2 in the hinder pair; the anal loop contains 6 or 7 cells and the nodal index is 9.14.14.7 in the fore wing, 9.9.8.9 in the hind wing. The yellow spots on the dorsum of abdominal segment 4 are relatively of large size, fused together but narrowly indented by black anteriorly; the spots on 5, though much smaller, are quite distinct and likewise coalescent posteriorly. The succeeding segments are marked similarly to French specimens, 6, 9, and 10 being entirely black, except a pair of small transverse streaks of yellow, one on each side, placed on the ventral surface at extreme base of the 9th tergite. Its measurements are: abd. + app. 50.2 mm, hind wing 45.0 mm, pterostigmata 2.8 mm.

Female. — In all specimens examined the 8th abdominal tergite is without any trace of yellow colouring, thus differing markedly in this respect from the male. The vulvar lamina is very short, with a small U-shaped emargination, the lobes on each side of the latter being represented by a thickening of the posterior edge of the 8th sternite.

The pair in the Museum Koenig at Bonn measure: ♂ abd. + app. 53.5, hind wing 46.0 mm; ♀ 54.0 and 45.0 mm, respectively.

Additional notes on the larva of *M. splendens* Pictet (pl. 4).

The description published by P. Grassé (1930) is very full and accompanied by a good figure of the whole insect and its antenna. Grassé's sketch of the labium being insufficient, I here offer a more detailed one taken from one of the exuviae. These latter correspond closely with the description, except that the number of mental and palpal setae seems to vary. In Grassé's specimen there are 7 + 1—2 mental and 6 palpal setae on each side, while 1—2 additional and somewhat shorter setae are placed at the base of each palpus, followed by 3—6 very minute ones placed in an arc. Our examples agree in all this, except that the number of major setae varies from 7—9 for the mental and 4—5 for the palpal setae. The palpi (lateral lobes) have 6 rounded projections with feebly undulated margins and 5 indentations, the apical projections being again divided while all projections are furnished with 8—11 strong bristles. The frontal horn is conspicuous, erect, the edge between its posterior face and the level surface behind it being approximately a right angle. The eyes are very prominent as are also the tubercles on the postero-lateral angles of the head. The abdomen has strong, almost straight, postero-lateral spines on segment 8 and 9 and dorsal hooks are present on segments 2—10, as shown in the figures.

The colour-pattern in two unsoiled exuviae is as shown in Grassé's picture of a mature larva; it is hardly evident in our photograph as this was taken from a specimen thinly incrusted with fine mud, especially adhering to the legs. The femora bear, however, three indistinct brown bands not shown in Grassé's picture.

Measurements. Total length 31.5 mm, length of abdomen 18.0 mm, greatest

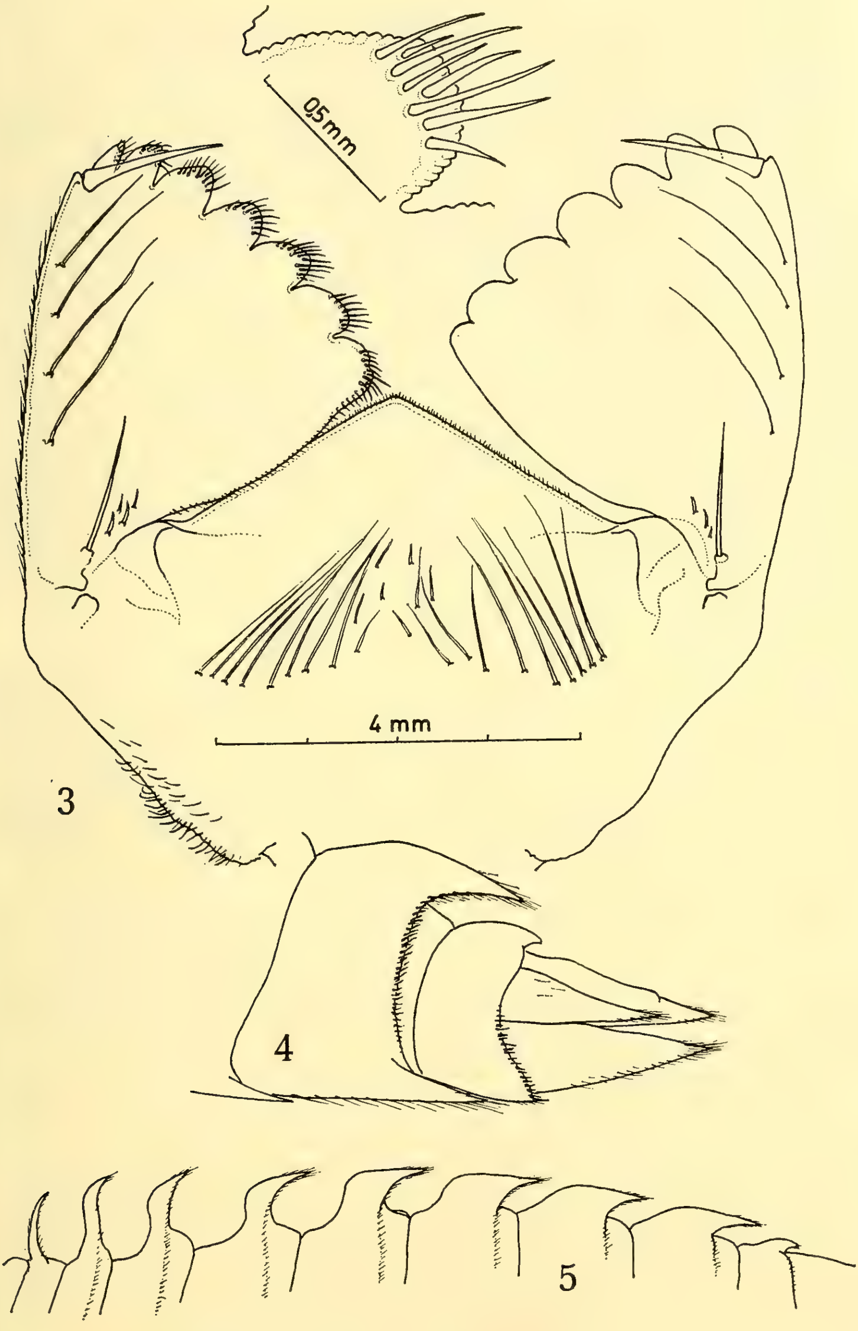


Fig. 3—5. *Macromia splendens* Pictet, ♂ exuvia from Larroque-des-Arcs (Lot); 3, dorsal view of mentum and palpi, flattened out, with 4th setiferous palpal projection more highly magnified (setae on projections of right palpus omitted); 4, left side view of terminal abdominal segments; 5, left side view of dorsal abdominal hooks on segm. 2—10

width of same 12 mm, posterior femur 14.5 mm, and posterior tibia 13.0 mm. (GRASSÉ gives 28,—, 13.5, 14, and 13 mm, respectively, for the larva).

Agrees in general appearance with the supposed larva of *M. manchurica* Asahina (1964), described and figured by POPOVA (1953: 168—171) and with those of the two different species A and B, both from Fukien (E. China) that were discussed and illustrated by myself (1955: 259—263). The differences between these species are best understood by comparing the descriptions and published drawings. The larva of *M. splendens* conforms most closely in the structure of its labium with the Chinese larva B, which also has the meso-metasternal projections reduced to low tubercular swellings. According to ASAHINA's (1959: 85) figures of the Japanese *M. daimoji* Okum., the dorsal hooks on the abdomen are smaller (and absent on segment 10), while the marginal projections of the labial palpus appear to be more deeply indented. As far as I am aware from the literature, the larva of *M. amphigena* Selys has never been sufficiently characterized (FRASER, 1936). Of the described larvae in the New World species (see WALKER, 1937), *M. splendens* seems to come nearest *illinoiensis* Walsh and *rickeri* Walker, more especially to the former, but the strongly upcurved frontal horn of *splendens* is not acute at its apex, the dorsal abdominal spines are longer and more abruptly curved backwards, and there are also differences in the labial structure.

GENERAL REMARKS

Much, still, has to be learned about the life history of *M. splendens*. Interesting observations on the habitat and ethology of *Macromia* in temperate regions, adults and larvae, are to be found in the publications of KENNEDY (1915), WALKER (1937), WHITEHOUSE (1941) and WILLIAMSON (1909). Only nearctic forms are dealt with by these authors. More detailed information relating to tropical Asiatic species of *Macromia,* particularly on the adaptive features exhibited by their larvae, is supplied by LIEFTINCK (1950).

Very few investigations have yet been made on the habitat of the earliest instar larva of macromiine dragonflies, only that of the allied genus *Epophthalmia* having been described and figured (LIEFTINCK, 1931 : 76—79, fig. 25—27). Morphologically this differs considerably from the full-grown stage, showing curious adaptations to its environment. This point in particular is well worth attention when it comes to working out the complete biology of *M. splendens.*

I have failed to find any record in the literature on *Macromia* about the duration of larval life; hence, for the time being any opinion concerning the life cycle of its members must remain a conjecture. To me it seems most probable that the warm temperate forms of *Macromia* conform to a type of life history known to exist in the summer species among the Corduliidae and Gomphidae which occur at more northern temperate latitudes. This would imply that different sizes of overwintering young larvae can be found in any suitable habitat at a time when adult dragonflies of an older generation are on the wing.

As far as tropical species are concerned, we know for certain that in all riverine habitats showing no marked seasonal fluctuations of atmospheric or water temperature, there is a continuous succession of generations throughout the year. But even so, breeding experiments

carried out by me in Java and Malaya with larvae in different stages of development pointed to a relatively long life cycle. Without exception individuals reared in captivity under optimal conditions of food showed the last two or three larval instars to move, feed and grow remarkably slowly. Thus in two young larvae of *M. cincta* Ramb. from South Sumatra, the antepenultimate instar took an average of 90 days. Specimens of *M. moorei fumata* Krüg., dredged up as full-grown larvae, required 65—82 days before transformation took place. Similarly, a male of *M. gerstaeckeri* Krüg. in the ultimate instar was bred out only after 85 days. As these mature larvae were collected already some time after the last ecdysis had taken place, the total life-span of the last instar must have been even longer. The most extended period of life ever recorded for a *Macromia* larva in the final stage was that of the lowland species, *M. arachnomima* Lieft., from S. Borneo, which lived 120 days from the date of its capture till transformation, its emergence being preceded by a period of complete dormancy which lasted 30—40 days. (See LIEFTINCK, 1950 : 676, and 1953 : 406.)

Of course, the above facts only serve as guide in future studies of the total duration of larval life in *Macromia*; but we may, perhaps, infer from what we know of reared specimens in the tropics that the palaearctic *M. splendens* normally is either semivoltine or even has a larval period occupying three years. Inclement winters may cause the insect to be met with in numbers only in certain spaced years when a major emergence has taken place.

Regarding our species, I have little hesitation in expressing the opinion that at least its later larval stages develop and reach maturity in the quieter and warmer rivers, whence the perfect dragonflies on emergence scatter themselves over a wide area in search of food and shelter. After this "pre-reproductive period" (CORBET, 1962 : 120), adults return to the breeding sites. Several authors have called attention to the fact that after the maturation period, the imagines of rheophilous insects tend to migrate upstream, working towards swifter waters. This tendency of upstream migration of adults in the reproductive stage has been observed in unrelated groups and may serve to offset the washing down of larvae during times of heavy flooding when aquatic stages may become dislodged and swept away by the current. (See, for instance, KENNEDY, 1917, for nearctic Gomphidae; IDE, 1940, for nearctic Ephemeroptera; LIEFTINCK, 1941 and 1950, for Malaysian Gomphidae and *Macromia*, respectively.) It is possible that *Macromia splendens* under certain circumstances shows a corresponding behaviour.

In view of the fact that the exuviae found on the present occasion are only thinly coated with mud particles, the older instar larvae most likely are only superficial burrowers or dwell among benthic material on bottoms of a distinctly soft, muddy character.

RELATIONSHIP

Any attempt to ascertain the affinity of *M. splendens* with other species of this widely distributed genus can only be arrived at after a searching investigation into colour, venation and, above all, details of structure. Many species have been described in great detail but we are less informed about the morphology of the head and legs, while the structure of the reproductive organs of both sexes have not for each taxon been studied and figured in sufficient detail. There can be no doubt, however, that *splendens* is most nearly related to its congeners occurring

in the temperate regions. All of these differ markedly in several respects from the tropical groups within the genus.

Considering first the North American members of *Macromia*, the key characters employed by WALKER (1937) and WESTFALL (1947), though quite useful, are mainly based on colour. I have for comparison six out of the ten species known in the adult stage. With the exception of *M. taeniolata* Ramb., these correspond fairly well in general appearance and body structure, the projecting frons with its pronouncedly flattened and rimmed surface being especially noteworthy. Yet each of them shows a combination of characters not shared by *splendens,* suggesting only remote affinity. On examining the wealth of tropical *Macromia* for some indication as to the relationship of these forms, I have often found it difficult to judge which of their specific characters should be considered most important, for one is met by the remarkable fact that these features are variously mixed. As far as structure is concerned, the following example may demonstrate the difficulty in associating our species with any of the New World members. *M. magnifica* Mac Lachlan and *rickeri* Walker differ from the eight others by having no keel on the flexor side of the middle tibia, agreeing in this respect with *splendens*; at the same time these two species show no sign of an external tooth at the superior appendage, whereas in *splendens* (and most of the remaining nearctic species as well) such a tooth is conspicuously present. All I can say at present of these North American members is that *magnifica, rickeri* and *wabashensis* show the nearest approach towards the European species.

Turning now to the Old World members of the genus, the reader may be referred to an earlier paper (LIEFTINCK, 1955) in which are listed all species then known to occur in the far north-eastern countries of Asia. On that occasion it was pointed out that *M. amphigena* Selys, *fraenata* Martin, *sibirica* Djakonov, *daimoji* Okumura and possibly a few others of unknown status, belong to a group having mainly a palaearctic distribution. In a recent paper, ASAHINA (1964) treats the Korean *fraenata* as a subspecies of *amphigena.* He also describes two new species, *kubokaiya* from the Ruykyus (Okinawa) and *manchurica* from East Manchuria, the latter possibly coinciding with a larva from Lake Hanka described and figured — but left without a name — by POPOVA (1953). They form a group of allied species but differ among themselves correspondingly to those occurring in the nearctic region. *M. daimoji* and *manchurica* agree with *splendens* by having a simply hooked posterior hamule and no keel on the mesotibia; both are, however, more slender species with shorter wings. *M. amphigena* and *fraenata* on the other hand, have the facies and robust build of *splendens,* the latter even exhibiting yellow marks on top of frons, but in them the frons is shorter and more rounded, and they also possess a hammer-shaped hamule and mesotibial keel, thus differing markedly from *splendens.* Considering all this, we arrive at the conclusion that *M. splendens,* though having many features in common with the northern nearctic and north-eastern palaearctic members of the genus, stands apart from all others. Of all known species it resembles the Japanese *amphigena* most closely in stature and markings.

DISTRIBUTION

As to the distribution in France, DE SELYS (1871 : 185) already says: "entre le Languedoc et la côte de Bretagne, sur une bande étroite", the closing sentence, perhaps, suggesting a line of thought elaborated much later by MORTON after his discovery of an intermediate location. He wrote as follows: "... It may be expected with some confidence to occur on other tributaries of the Garonne rising in Central France, such as the Dordogne and the Tarn. And there seems to be no good reason why it should not still occur on the Charente. Perhaps there is less probability of its existence in the rivers which have their sources in the higher Pyrenees, as these are probably liable to be cooled by snow water to a later period in the summer than those rising in Central France." (loc. cit.: 15). These comments on the possible extent of its range are interesting and may prove to be quite true as no single record is yet known from the tributary streams arising in the south.

From what has been communicated by MORTON and later observations, it appears that the species in two distant places where it formerly occurred is still thriving. The northernmost records, Jarnac (Charente) and "Anjou" are almost a century old and have never been confirmed, but even at present there seems to be nothing to account for its disappearance there. MORTON relates to a specimen said

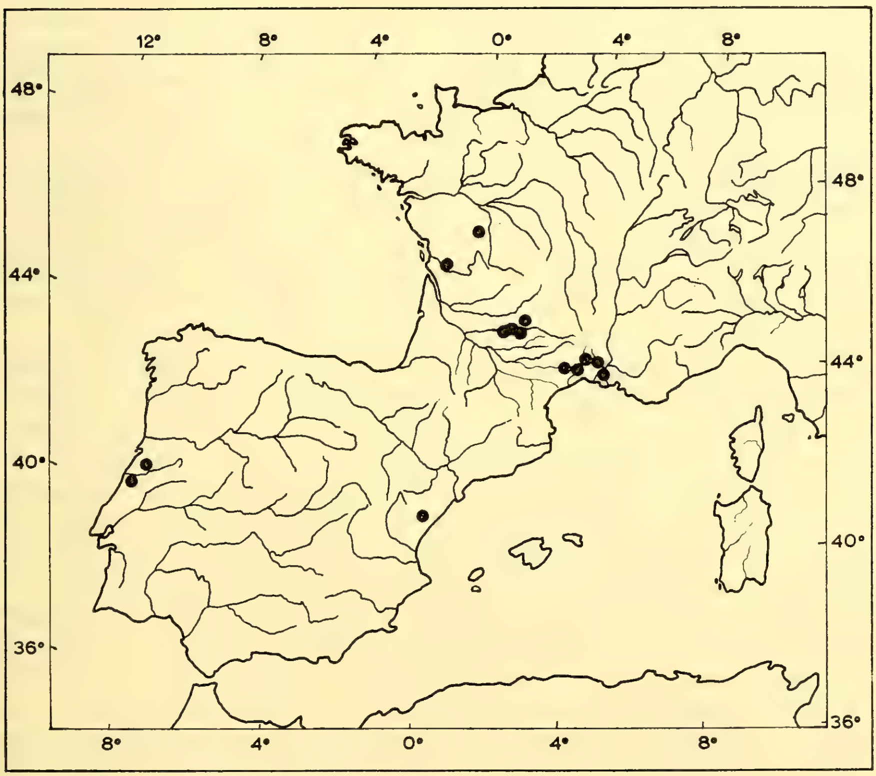


Fig. 6. Map of southwestern Europe showing the known locality records of *Macromia splendens* Pictet

to have come from the "Bouches du Rhône", which he saw in MAC LACHLAN's private collection. This might still be found amongst the accessions, but the only specimens I could find in the British Museum and which are now incorporated in the general collection, are the pair from Charente taken by DELAMAIN (1868). These formed part of a long series, of which several were presented by DE SELYS LONGCHAMPS to his personal friends and correspondents.

The accompanying map (fig. 6) indicates the isolated occurrence of our species in western Europe. It is only a preliminary conspectus and the gaps in it will of course be filled up by future observations, but it gives all localities at present known, including the old Iberian records of NAVÀS (1923, 1924) and DE SEABRA (1937). I have had no opportunity as yet of examining any Spanish individual of *M. splendens.* NAVÀS (1923 : 9) reported it from Segorbe (Castelló), but Dr. PAU, from whom the specimen was received, informed him that it might also have come from the Serra Camarena. In a letter to MORTON the same author wrote that he believes this unique Spanish (Catalonian) example was taken in June or July (MORTON, 1925 : 15). Prof. G. CEBALLOS informed me in a letter that the species is not represented in the Instituto Español de Entomología at Madrid. Sr. A. COMPTE SART even asserts that no specimens could be traced in any of the entomological collections of the museums in Barcelona (Museo de Zoología) or Madrid; he adds that NAVÀS's collections at the Jesuit's Colegio de Salvador (Zaragoza) were partly destroyed and that there was no possibility to verify the rest that was divided up between the Colegio at Zaragoza and the Barcelona Museum. Thus all my inquiries into the whereabouts of an authentic Spanish individual of *M. splendens* remained ineffectual.

As to the Portuguese records of our species, these are apparently based only on two specimens, one discovered by the late Prof. A. F. DE SEABRA near Soure, a coastal locality west of Coimbra, and a second cited by Padre NAVÀS as from "Poigres", which according to Dr. DINIZ (in litt.) undoubtedly should be Poiares (Beira Litoral), about 25 km east of Coimbra. The specimen examined by me is the one from Soure, which was probably taken at the Rio Mondego.

In the northern hemisphere three nearctic species, namely *illinoiensis* Walsh, *magnifica* Mac Lachlan and *rickeri* Walker, penetrate into the Canadian zone between lat. 49° and 50° N, but even the wide-ranging *illinoiensis* does not extend beyond the Hudson Bay watershed, and no species have so far been recorded from the subarctic region. On the mainland of the eastern Palaearctic, the Japanese *amphigena* Selys occurs as far north as the lower reaches of the Amur (about lat. 50° N). *M. sibirica* Djakonov apparently has a more westward distribution, for it is recorded from a large area between the Baikal Lake and the wooded districts of the Jenisei and Ob, near Novosibirsk (long. 83° E, lat. 55° N), which at the same time is the northernmost locality for any *Macromia* and the point least remote from the habitat of *M. splendens.*

To sum up shortly: *M. splendens* is the only representative of *Macromia* in Europe, its nearest relatives being found in the temperate parts of the Nearctic and eastern Palaearctic. The available evidence indicates that the insect is geographically restricted to those areas of southwestern Europe that have a mild climate (SW. France, W. Portugal and E. Spain). It is apparently confined to the

plains and hills not above 300 metres, frequenting streams with a slow current, in which it also breeds. In view of its scattered distribution the insect could probably only maintain itself in the warmer parts of its range, where the climate is most uniform in character, and it is conceivable that *M. splendens* represents an Eurasian remnant of a much richer preglacial (Late Pleistocene) fauna whose constituents became largely extinct as a result of the colder climate during the last pleistocene glaciation.

One point remains to be considered. I have been advised not to notice the special localities of *M. splendens* in any detail, because, once the attention has been drawn to its haunts, an invasion of *Macromia* hunters would be unavoidable, and this may hasten its decline or even cause its extermination. Collectors in the early days were few, whereas at present every corner of a country has its eager explorer, either resident or visitor.

Of course, species of localized distribution requiring a particular kind of soil or food-plant to live on are, indeed, in real danger even in France. There are notable examples among butterflies and beetles which in localities where they were plentiful in former times are now gradually disappearing. It is true that *M. splendens* exists in a comparatively limited area of France and to a certain extent is of local occurrence even in that country. But, first of all, there is no evidence for considering it to be an insect once more or less widely distributed that has gradually become more narrowly localized. Localization may generally be looked upon as the first step to extinction, but in our case the restricted occurrence is, I believe, due to natural physical conditions, such as topography and climate. No doubt the nature of the stream-bed in combination with a high average yearly temperature of the water and an abundant supply of food are the most important factors contributing to its maintenance. As to the principal cause that may precipitate its destruction and lead to its extinction, I cannot but think that these are brought about directly by man's agency. Industrialization and the pollution of streams as well as the establishment of modern "recreation" centres in suitable localities may ultimately prove fatal. Fortunately, the species mainly abounds in a country where there is neither an extension of towns or industry, nor an excessive cultivation needed for a rapidly increasing population. It may be remembered also that in the Midi of France and towards the south there is a multitude of streams, many of them still unexplored and difficult of access. Needless to say, *M. splendens* is a swift and strong flier which easily escapes notice. In connection with this it would appear to me that overlapping of generations will prevent the species from becoming extinct and that the chances of its utter annihilation through over-collecting are remote. In this particular case all I would implore collectors is to refrain from taking the females, unless there is a positive reason for so doing. Let us hope that disaster, physical or otherwise, may long be absent, and so avert its extinction!

A c k n o w l e d g e m e n t s. — I am under deep obligation to Dr. MANUEL DE ASSUNÇAO DINIZ (Museo e Laboratorio Zoologico, Universidade de Coimbra) and Señ. LUIZ DE SEABRA (Laboratorio de Histologia e Tecnologia de Madeiras, Lisbon) for helpful suggestions and the supply of literature on the subject. Also,

to Prof. C. M. BAETA NEVES (Entomologia Agricola e Florestal of the Instituto Superior de Agronomia, Lisbon), Ing. C. FREIRE TEMUDO and Ing. Silv. C. D. SERRÃO NOGUEIRA (both on the Servicos Florestais e Aquicolas, Lisbon), who gave useful information and readily sent me on loan the only known Portuguese example of *M. splendens.* My best thanks are due to Prof. GONZALO CEBALLOS (Instituto Español de Entomología) and Sr. ARTURO COMPTE SART (Instituto de Edafologia y Biologia Vegetal), both in Madrid, for supplying information on the collection of L. NAVÀS. Lastly, I wish to thank my colleague Dr. K. H. BUCHHOLZ (Zoologisches Forschungsinstitut u. Museum A. Koenig, Bonn), who kindly supplied some measurements for inclusion in this paper.

REFERENCES

ASAHINA, S., 1959. Illustrated insect larvae of Japan. Tokyo : 59—62, fig. (*Macromia daimoji* Okum., larva: 85, fig.).

———, 1964. Contributions to the knowledge of the dragonflies of the genus *Macromia* in the northeastern Asia. Jap. Journ. Zool. 14 : 109—117, fig. 1—39.

CABOT, L., 1890. The immature state of the Odonata. Part III. Subfamily Cordulina. Mem. Mus. Comp. Zoöl. Harv. Coll. 17 (1): 1—52, pl. I—VI. (Larvae of various *Macromia* spp.).

CASSAGNE-MEJEAN, F., 1963. Sur la faune des Odonates de la région Montpelliéraine. Ann. Soc. Hort. & Hist. Nat. de l'Hér. 103, 7 pp.

CORBET, P. S., 1962. A biology of dragonflies. London, xvi + 247 pp., 115 fig.

DELAMAIN, H., 1868. *In* De Selys Longchamps. Observations sur les habitudes de .... *Macromia splendens* Pictet. Assemblée mens. 1er août 1868. C.R. Soc. Ent. Belg. 11 : XCII—XCIII. (Extracts of M. Delamain's letters to De Selys Longchamps about the occurrence of *M. splendens* in the dép. Charente [Jarnac and Angoulême]).

FALLOU, J., 1868. Announcement, in Bull. ent., séance 25 nov. 1868 : CVII (Soc. Ent. France [4] 8, 1868).

FRASER, F. C., 1936. Odonata collected in Japan, with descriptions of three new species. Trans. R. Ent. Soc. London 85 (5): 153—154, fig. 4 (drawings of supposed larva of *Macromia amphigena* Selys).

GRASSÉ, P., 1930. La nymphe de *Macromia splendens* Pictet (Odonate anisoptère). Ann. Soc. Ent. France 99 : 9—14, fig. 1 (antenna and labial mask), pl. 2 (larva).

HARANT, H. & D. JARRY, 1963. Guide du Naturaliste dans le Midi de la France. II. Neuchatel. 369 pp., fig. (*M. splendens* : 260; fig. 288, ♀ & fig. 315, larva).

IDE, F. P., 1940. Quantitative determination of the insect fauna of rapid water. Univ. Toronto Studies, Biol. Ser., Publ. Ontario Fish. Res. Lab. 59: 1—20, pl. I—IV.

KENNEDY, C. H., 1915. Notes of the life history and ecology of the dragonflies (Odonata) of Washington and Oregon, 4. Notes on *Macromia magnifica* and its nymph. Proc. U.S. Nat. Mus. 49 : 313—322, 27 fig.

———, 1917. Notes on the life history and ecology of the dragonflies (Odonata) of Central California and Nevada. Ibid. 52 : 483—635, fig.

LIEFTINCK, M. A., 1931. A revision of the genus *Epophthalmia* Burm. (Odon., Corduliinae), with notes on habits and larvae. Treubia 13 : 21—80, pl. I & 29 fig.

———, 1941. Studies on Oriental Gomphidae (Odon.) with descriptions of new or interesting larvae. Ibid. 18 : 233—253, pl. 9—15.

———, 1950. Further studies on southeast Asiatic species of *Macromia* Rambur, with notes on their ecology, habits and life history, and with descriptions of larvae of two new species (Odon.). Ibid. 20 : 657—716, fig. 1—61.

———, 1953. New dragonflies (Odonata) from Borneo, with notes on their habits and larvae. Ibid. 22 : 381—406, fig. (*Macromia* spp.: 395—406, figs.).

———, 1955. Further inquiries into the Old World species of *Macromia* Rambur (Odonata). Zool. Meded. Leiden 33, no. 25 : 251—277, 28 fig.

MARTIN, R., 1907. Cat. Coll. Zool. Selys, 17, Cordulines. Bruxelles, 98 pp., 3 pls. (*M. splendens* : 66, fig. 84, ♂ appendages).

———, 1914. Cordulinae *in* Wytsman, Gen. Ins. 155 : 24, pl. 3 fig. 19 (colour picture of male *M. splendens*).

MORTON, K. J., 1925. *Macromia splendens* at last: an account of dragonfly hunting in France. Ent. Mon. Mag. 61 : 11—15.

NAVÁS, L., 1923. Excursions entomològiques de l'istiu de 1922. Arxius de l'Institut de Ciències Barcelona, 1923 : 1—34, fig. (*M. splendens* : 9).

———, 1924. Sinopsis de los Paraneurópteros (Odonatos) de la peninsula iberica. Mem. Soc. Ent. España (Zaragoza) 1a : 25 (Portuguese and Spanish records of *M. splendens*).

PICTET, F. J., 1843a. Description d'une nouvelle espèce de Névroptère du genre *Cordulia*, découverte en France. Avec une note additionelle de M. De Selys Longchamps. Revue Zool. Soc. Cuvierienne, Année 1843, (published May, 1843), 6 : 131 (Diagnosis of *Cordulia Splendida* [rect. *splendens*] nov.)

———, 1843b. Cordulie splendide. *Cordulia splendens*. Pictet. — With additional remarks by E. de Sélys Longchamps, signed: Avril 1843. *In* Guérin, Magasin de Zoologie, Année 1843, [2e sér.] 13 : 1—2 (Pictet), 2—3 (de Sélys), Insectes. Pl. 117 (colour picture of young female).

POPOVA, A. N., 1953. Lichinki strekoz fauny S.S.S.R. (Dragonfly larvae of the fauna of USSR). Keys to the fauna of USSR. Zool. Inst. Acad. Sci. USSR, no. 50, Leningrad 1953 : 1—235, fig. 1—141 (in Russian). (*Macromia* spec.: 168—171, fig. 105—106).

RENOUST, M., 1961. Nouvelle capture de *Macromia Splendens* Pictet ♀ dans les environs de Montpellier. Ann. Soc. Hort. & Hist. Nat. de l'Hér. 101 : 180—182 and photograph of female.

SEABRA, A. F. DE, 1937. Notas entomológicas. Odonata. Mem. Estudos Mus. Zool. Univ. Coimbra [1] no. 101 : 5—7, fig. 9—12 (*M. splendens* : 6—7, fig. 11, wings & 12, ♂ app.).

———, 1937. Notas sôbre os Odonatos de Portugal. Ibid. [1] no. 104 : 1—14 (*M. splendens* : 11 & 12).

———, 1937. Catálogo das Colecções Entomológicas. Publ. Dir. Geral Serv. Florest. 6 (2), 291 pp. (*M. splendens* : 194—195).

———, 1942. Contribuïçoes para o inventario da fauna lusitânica. Ins. Odonata. Mem. Estudos Mus. Zool. Univ. Coimbra, no. 129 : 1—8 (*M. splendens* : cat. : 5).

SELYS LONGCHAMPS, E. DE, 1871. Synopsis des Cordulines. Bull. Acad. Belg. (2) 31 : 238—565 (*M. splendens* : 540—541).

———, 1878. Sec. Addit. Syn. Cordulines. Ibid. (2) 45 : 183—222 (*M. splendens* : 185).

SELYS LONGCHAMPS, E. DE & H. A. HAGEN, 1850. Revue des Odonates ou Libellules d'Europe. Mém. Soc. Sci. Liège, 6, Bruxelles, xxii + 408 pp., 6 tables, 11 plates (*M. splendens* : 78—81, pl. 2 fig. 2, ♂ app.).

WALKER, E. M., 1937. A new *Macromia* from British Columbia (Odon., Corduliidae). Canad. Entom. 69 : 5—13, fig.

WESTFALL, M. J., 1947. A new *Macromia* from North Carolina. J. Elisha Mitchell Sci. Soc. 63 : 32—36, fig.

WHITEHOUSE, F. C., 1941. British Columbia dragonflies (Odonata), with notes on distribution and habits. Amer. Midland Naturalist 26 : 488—557, fig. (*Macromia* spp.: 492—493, 526—528).

WILLIAMSON, E. B., 1909. The North American dragonflies (Odonata) of the genus *Macromia*. Proc. U.S. Nat. Mus. 37 : 369—398, pl. 35—36.

Exuvia of *Macromia splendens* Pictet, from Larroque-des-Arcs (Lot), 28.VI.1964

M. A. LIEFTINCK: *Macromia splendens in Europe*

Entomologische Berichten

De *Entomologische Berichten* worden eveneens door de Nederlandsche Entomologische Vereeniging uitgegeven en zijn bestemd voor de publicatie van kortere artikelen, van faunistische notities etc., alsmede van de Verslagen der Vergaderingen en van mededelingen van het Bestuur. Zij verschijnen twaalf maal per jaar in een aflevering van 16 of meer bladzijden. Deze 12 afleveringen vormen samen een deel.

Trichopterorum Catalogus

De Trichopterorum Catalogus van F. C. J. Fischer wordt door de Nederlandsche Entomologische Vereeniging voor rekening van de auteur uitgegeven. De eerste vijf delen verschenen in 1960—1964. In totaal worden het 15 delen. Alle bekende recente en fossiele soorten van de gehele wereld met hun synoniemen worden er in behandeld. Van alle genera worden de type-soorten aangewezen en de literatuur zal van 1758 tot eind 1960 met de geografische verspreiding vermeld worden. Delen I en II kosten *f* 39,— per stuk, delen III—V: *f* 45,—. Van alle delen zijn ook éénzijdig bedrukte exemplaren beschikbaar. De prijsverhoging hiervoor bedraagt *f* 2,50.

Alle zakelijke correspondentie betreffende de Vereeniging te richten aan de Secretaris, W. Hellinga, Weesperzijde 23II, Amsterdam-O.

Alle correspondentie over de redactie van het Tijdschrift voor Entomologie te richten aan de Redacteur, Dr. A. Diakonoff, Rijksmuseum van Natuurlijke Historie, Leiden.

Alle correspondentie over de redactie van de Entomologische Berichten te richten aan de Redacteur, B. J. Lempke, Oude IJselstraat 12III, Amsterdam-Z. 2.

Alle betalingen te richten aan de Penningmeester, Drs. H. Wiering, Doorntjes 29, Bergen (N.H.), postgiro 188130, ten name van de Nederlandsche Entomologische Vereeniging te Bergen (N.H.).

Alle correspondentie betreffende de Bibliotheek der Vereeniging te richten aan de Bibliotheek, Zeeburgerdijk 21, Amsterdam-O.

Notice to Subscribers

All correspondence referring to subscriptions and exchange of the periodicals of the Netherlands Entomological Society should be addressed to the Librarian, Zeeburgerdijk 21, Amsterdam-O, Netherlands.

NOTICE TO CONTRIBUTORS

Contributors will receive free of charge fifty reprints of their papers, joint authors have to divide this number between them at their discretion. Additional reprints may be ordered when returning proofs.

Manuscripts should be written in Dutch, English, French, German or Italian. If they contain descriptions of new genera, species, etc., they should be in one of the four last mentioned languages.

The author should communicate with the editor before submitting his manuscript. He will enclose with manuscript a Synopsis (Abstract), styled according to recommendations of the UNESCO (style rules will be provided by the editor) and, if needed, a Summary. Papers in Dutch should contain an Abstract and/or a Summary in one of the four other languages.

Manuscripts should be typewritten in double spacing on only one side of the paper, with a margin of at least three cm at the left side of each sheet. Paragraphs should be indented. Carbon copies cannot be accepted, as handling makes them illegible.

Captions for text figures and plates should be written on a separate sheet in double spacing, numbered consecutively in arabic numerals; the use of a, b, c, or any other subdivision of the figure numbering should be avoided.

Drawings for reproduction should be on good paper in Indian ink, preferably at least one and a half times as large as the ultimate size desired. Lettering should be uniform, and, after reduction, of the same size. Photographs should be furnished as shiny positive prints, unmounted. Plates should be arranged so as to fill a whole page (11.5 x 19 cm) of the *Tijdschrift,* or a portion thereof, captions included. Combinations of illustrations into groups are preferable to separate illustrations, since there is a minimum charge per block.

Names of genera and lower systematic categories, new terms and the like are to be underlined by the author in the manuscript by a single straight line. Any other directions as to size or style of the type are given by the editors, not by the author. Italic type or spacing to stress ordinary words or sentences is to be avoided. Dates should be spelled as follows: either "10.V.1948" or "10 May, 1948". Other use of latin numerals should be avoided, as well as abbreviations in the text, save those generally accepted. Numbers from one to ten occurring in the text should be written in full, one, two, three, etc. Titles must be kept short. Footnotes should be kept at a minimum.

Bibliography should no be given in footnotes but compiled in a list at the end of the paper, styled as follows:

Mosley, M. E., 1932, "A revision of the European species of the genus *Leuctra* (Plecoptera)". — Ann. Mag. Nat. Hist. [10] 10 (3): 1—41, pl. 1—5, fig. 1—57. Number of issue should only be added (in parentheses) when it has individual pagination.

Text references to this list might be made thus:

"Mosley (1932) says...." or "(Mosley, 1932)".

The editors reserve the right to adjust style to certain standards of uniformity.

Manuscripts and all communications concerning editorial matters only should be sent to: Dr. A. DIAKONOFF, Rijksmuseum van Natuurlijke Historie, Leiden, The Netherlands.

DEEL 108 AFLEVERING 3

TIJDSCHRIFT VOOR ENTOMOLOGIE

UITGEGEVEN DOOR

DE NEDERLANDSCHE ENTOMOLOGISCHE VEREENIGING

INHOUD:

Tijdschrift voor Entomologie, deel 108, afl. 3. Gepubliceerd 16-IV-1965

Nederlandsche Entomologische Vereeniging

Bestuur

Commissie van Redactie voor de Publicaties

Bestuur der Afdeling voor Toegepaste Entomologie

De contributie voor het lidmaatschap bedraagt f 15.—, voor student-leden f 2.50, per jaar. — Begunstigers betalen jaarlijks tenminste f 15.—.

De leden, behalve de student-leden, ontvangen gratis de *Entomologische Berichten* van 12 nummers per jaar, waarvan de prijs voor student-leden f 1.50 per jaar, voor niet-leden f 20.— per jaar en f 2.— per nummer bedraagt.

De leden kunnen zich voor f 10.— per jaar abonneren op het *Tijdschrift voor Entomologie;* hiervan bedraagt de prijs voor niet-leden f 35.— per jaar.

De eerder verschenen publicaties der Vereeniging zijn voor de leden tegen verminderde prijzen verkrijgbaar.

Tijdschrift voor Entomologie

Het *Tijdschrift voor Entomologie* wordt uitgegeven door de Nederlandsche Entomologische Vereeniging en is bestemd voor de publicatie van de resultaten van de studie der Entomologie van algemene en bijzondere aard. Het verschijnt in één deel van 300—400 bladzijden per jaar, bestaande uit enkele afleveringen. Bovendien worden monographieën handelende over bijzondere onderwerpen, met onregelmatige tussenpozen uitgegeven.

ON THE IDENTITY OF COELOTES ATROPOS (WALCKENAER), SAXATILIS (BLACKWALL) AND TERRESTRIS (WIDER) (ARANEIDA, AGELENIDAE)

BY

Fr. CHRYSANTHUS O.F.M. Cap.
Oosterhout, Netherlands

Abstract

For a long time there has been much confusion among arachnologists about the correct identity of the above-mentioned species, of which the original descriptions appeared between 1830 and 1834. In the course of the 20th century a stabilization was gradually achieved, and especially since 1953 most authors distinguished two species: *C. atropos* (Walckenaer, 1830) and *C. terrestris* (Wider, 1834).

A study of the original descriptions and of some data in the respective literature has led to the conclusion that most authors have interpreted the original description of *atropos* erroneously. It appeared that *C. atropos* Walckenaer is identical with the species recorded, especially since 1953, as *C. terrestris,* whilst the species recorded, especially since 1953, as *C. atropos,* should be denoted with the name *C. saxatilis* Blackwall.

A comparative study of an extensive collection of specimens from different regions resulted in the conclusion that the identification of the males of these species is fairly easy, whereas none of the characters used for the identification of the females, when considered separately, is absolutely reliable: sometimes several characters have to be taken into consideration simultaneously.

Drassus atropos was originally described by Walckenaer in 1830 (p. 171); an amplified redescription was published by him in 1837 (p. 627). The descriptions of two apparently closely related species appeared in the meantime, viz., those of *Clubiona saxatilis* Blackwall (1833 : 436) and *Aranea terrestris* Wider (1834 : 215). There is no doubt that these species all belong to the genus *Coelotes.* Up to now, however, there has been considerable confusion among arachnologists about the correct identity of these (and other) species of the genus. Nevertheless the opinion gradually prevailed that in West and Central Europe two common species only occur; authors did, however, not agree on the correct names and the synonymy.

Kulczynski was the first to make an attempt to elucidate the confusion about these species (Chyzer & Kulczynski, 1897 : 160—161; Kulczynski, 1906 : 438—440, 446—447), although he had to admit that he could not solve all difficulties. In his 1906 paper this author gave extensive descriptions (in Latin) and rather good figures of 20 European species of the genus *Amaurobius* (= *Coelotes*), including *atropos* and *terrestris*; according to him *saxatilis* was a synonym of *atropos.*

Good descriptions and partly also distinct figures are given by O. Pickard-Cambridge (1879), de Lessert (1910), Simon (1937), Locket & Millidge

(1953), and especially WIEHLE (1963); these authors distinguish two species, viz., *atropos* and *terrestris,* and consider *saxatilis* a synonym of *atropos.*

The species are, however, confounded by SIMON (1875) and BÖSENBERG (1902), whilst M. DAHL (1931) even regarded both *saxatilis* and *terrestris* as synonyms of *atropos.*

Because I was not completely satisfied with this situation, I started a study of the original descriptions and of some data in the respective literature, while a large number of specimens from different regions has been compared, viz., from the Netherlands (VAN HASSELT Collection, Rijksmuseum van Natuurlijke Historie, Leiden), South Limburg (Br. ARNOUD, Heerlen); from Germany, Stolberg and Goslar, Harz (Zoologisches Museum, Hamburg), Göttingen (Dr. H. HOMANN), Erlangen (Dr. E. TRETZEL); from Luxemburg (Dr. L. MULLER, Luxemburg, Mr. P. J. VAN HELSDINGEN, Leiden); from France, Chaville and Les Contamines (Muséum National d'Histoire Naturelle, Paris); from Switzerland (VAN HELSDINGEN, Mr. J. A. DE PRIESTER, Voorschoten) and from several parts of Great Britain, in the British Museum (Natural History); P. CAMBRIDGE Collection, University Museum, Oxford; Dr. G. H. LOCKET, Stockbridge.

I wish to thank Dr. L. VAN DER HAMMEN (Rijksmuseum van Natuurlijke Historie, Leiden), Dr. G. RACK (Zoologisches Museum, Hamburg), Dr. J. F. JÉZÉQUEL (Muséum National d'Histoire Naturelle, Paris), Mr. D. J. CLARK (British Museum, Natural History) and Mr. A. M. ACKLAND (University Museum, Oxford) and further all collectors mentioned above, for the kindness with which they put all these materials at my disposal; I am grateful to Dr. VAN DER HAMMEN, Dr. LOCKET and Dr. O. KRAUS (Senckenberg Museum, Frankfurt a. M.) for their suggestions with regard to this problem and their help in several details of my investigations.

The study led me to the following conclusions:

(1) Many authors, especially since 1953, correctly distinguish two species.

(2) *C. terrestris* Wider is a synonym of *C. atropos* Walckenaer; most authors erroneously interpreted the original description of *atropos,* so that, consequently, *C. terrestris* auct. = *C. atropos* Walckenaer, 1830; and *C. atropos* auct. = *C. saxatilis* Blackwall, 1833.

(3) The identification of the males is fairly easy; the characters of the patellar apophysis of the palp and the shape of several parts of the bulbus are clear and almost invariable;

(4) none of the characters given for the identification of the females is absolutely reliable, when considered separately, a fact already revealed by some contradictions between the descriptions by different authors.

(1) *C. atropos* auct. and *C. terrestris* auct. are two different species: a comparison of the descriptions and the figures, especially of the copulatory organs, clearly reveals specific differences.

(2A) *C. terrestris* Wider, 1834, is the same species as *C. atropos* Walckenaer, 1830. My arguments are the following.

(a) *Drassus atropos* was described after a female from "la forêt de Villers Cot-

terets" ± 70 km NE of Paris; WALCKENAER noted that the male was unknown (p. 172). In his redescription of the species in 1837 he described also a male from "le plateau de la montagne qui domine la butte du Trésor, laquelle fournit la source des Eaux-Bonnes, dans les Pyrénées, à l'extrémité de la vallée d'Ossau"; according to KULCZYNSKI (1906 : 438) this male belongs to a different species.

WALCKENAER gave an extensive description of the female, full of details; especially his description of the abdomen of the female is very clear; it runs as follows: "Abdomen ... brun ... ayant une ligne jaunâtre, fusiforme, qui, depuis le corselet, se prolonge jusqu'au tiers de la longueur de l'abdomen, et qui est trifide à son extrémité, ou qui se termine par trois traits ou virgules, dont les latérales sont les plus grosses, tandis que celle du milieu est plus fine et manque quelquefois. Cette raie jaune est bordée de noir, formant deux lignes qui se rejoignent à l'extrémité, et n'en composant plus qu'une qui atteint jusqu'à l'anus. Mais cette ligne noire est interrompue transversalement par quatre chevrons jaunâtres, qui font suite au chevron bifide ou trifide qui termine la ligne jaunâtre; et après cette ligne, le milieu du dos présente une suite de chevrons jaunes, parallèles, d'autant plus rapprochés entre eux, qu'ils se rapprochent le plus de l'anus." (p. 171).

From this quotation it appears that, after a thorough study, descriptions given by authors of the past sometimes are of greater importance than often has been assumed, especially when these refer to rather common species.

The type-specimen of *C. terrestris* is also a female; it originates from Beerfelden, ± 40 km ENE of Mannheim. WIDER's description is much shorter: with reference to the abdomen of the female he only says: "Hinterleib ... dunkel schwarzbraun. Ueber den Rücken läuft eine Reihe paarweise stehender, heller, länglich runder Flecken, die sich in einem Winkel vereinigen." (p. 215). "(Hinterleib) ... oben und in den Seiten ist es dunkel schwarzbraun, nur über die Mitte des Rückens läuft ein Streifen heller Doppelflecke, die sich in einem vorwärts gerichteten Winkel paarweise vereinigen, aber oft fast ganz verloschen sind" (p. 216).

We are certain as to the identity of this species because the type material is still present in the Senckenberg Museum, Frankfurt a.M. Dr. KRAUS made a careful study of these specimens, which convinced him that *C. terrestris* sensu WIEHLE, 1963 (= *terrestris* auct.) is identical with the types. He selected a female as lectotype (SMF 12228; leg. F. WIDER, 1824); the other specimens, two males and five females, he indicated as "lecto-paratypoids" (SMF 4725; leg. F. WIDER, 1824); he kindly permitted me to publish this selection herewith.

A comparison of WALCKENAER's description of *C. atropos* with WIEHLE's fig. 108 of *terrestris* and our fig. 4 shows that these agree in all details. It is true that the pattern of the abdomen is not always just as distinct (cf. LOCKET & MILLIDGE, 1953 : 20), so that in these cases one has to consider other characters (cf. our § 4); this circumstance does, however, not imply an inadequacy of WALCKENAER's description.

(b) WALCKENAER himself considered *C. terrestris* Wider a synonym of his *atropos*, 1837 : 628 — list of synonyms — "*Aranea terrestris*, Reus et Wider, Mus. Senckenb. p. 215, pl. 14, fig. 10 (Bonne figure)";

1842: 489 "M. Koch a raison de dire que j'ai eu tort de citer l'*Aranea terrestris*

de M. Wider, comme synonyme de la *Clubiona atrox,* mais il se trompe lorsq'il croit que mon *Drassus atropos* n'est pas la même espèce que l'*Aranea terrestris* de Wider, comme l'indique ma synonymie".

(c) The type-locality of *atropos* Walckenaer is "la forêt de Villers Cotterets" (± 70 km NE of Paris, altitude 200—500 m). SIMON collected in this forest, and stated that he only found "*terrestris*": "le *Drassus atropos* est même décrit de la forêt de Villers Cotterets où je n'ai trouvé que le *C. terrestris,* sans pouvoir affirmer que les deux ne se rencontrent pas dans certains endroits. *C. terrestris* est l'espèce des grands forêts du Nord et de l'Est (Ardennes, Normandie, Compiègne, etc.) tandis que *C. atropos* se trouve seul dans les bois des environs immédiats de Paris" (1937 : 1036, note).

It is a pity that SIMON did not keep the materials from different localities separately. Dr. JÉZÉQUEL could only send me two females and one male of *C. atropos* auct. from Chaville (between Paris and Versailles, leg. 8.V.1921) and two females and one male (leg. VIII.1913) of *C. terrestris* auct., originating from Les Contamines (Haute Savoie, a few km west of the Mont Blanc). I regret that I did not have the opportunity of obtaining material from the type-locality of *C. atropos* in order to designate a neotype, because this locality seems to be undisturbed. I may remark that only exceptionally the two species are found in the same region, viz., (a) England: two counties, one in the North and one in the South (Dr. LOCKET, personal communication); (b) Germany: Stolberg (Harz): *C. atropos* auct. (cf. Wiehle, 1963 : 290) and *C. terrestris* auct., four females and one male, collected in 1913, preserved in the Zoologisches Museum, Hamburg, where I could study these specimens.

It seems to me that the conclusion from the data mentioned by me in the foregoing paragraphs must be that *C. terrestris* Wider, 1834, is a synonym of *C. atropos* Walckenaer, 1830, and that consequently the species generally known as *C. terrestris* henceforward must be named *C. atropos* Walckenaer.

(2B) *C. "atropos"* auct. is not *C. atropos* Walckenaer but *C. saxatilis* Blackwall, 1833. The arguments are as follows.

(a) BLACKWALL published an extensive description of *Clubiona saxatilis* (1833 : 437); the most important part runs as follows: "Abdomen ...; its colour is yellowish brown with numerous black spots above and a black band, broad at the anterior part but gradually becoming narrower as it approaches the spinners, extending along the medial line; on each side of this band is a series of short, oblique, yellowish brown lines, which in some individuals, unite in the posterior region of the abdomen, forming angles whose vertices are directed forwards". A redescription of 1861 (p. 170) is nearly identical with that of 1833.

These descriptions fully correspond with typical specimens of *C. atropos* auct. (cf. WIEHLE, 1963, fig. 107 and our fig. 1) and not with the real *C. atropos* Walckenaer (cf. the description 2A, a).

(b) Dr. LOCKET has been so kind as to study specimens from the O. PICKARD-CAMBRIDGE collection (Oxford), viz., five males and thirteen females, with bottle label "*Coelotes saxatilis* Bl. — *atropos* Wlk." His conclusion is that these are really *C. atropos* auct.

(c) The type-locality of *saxatilis* Blackwall is (Mt) Snowdon in Caernarvon-

shire (Wales) "under loose fragments of rock" (1833 : 437). "This is a typical habitat of *atropos* (auct.) but *terrestris* is not recorded for that county" (Dr. Locket, personal communication).

More or less connected with the above-mentioned problem is the disagreement of arachnologists as to the correct name of the genus. Most authors use *Coelotes,* some others are of the opinion that *Amaurobius* should be preferred. Recently (1964) Levi & Kraus made an application to the International Commission on Zoological Nomenclature "(asking that the Commission will) use its plenary powers to suppress the generic names *Amaurobius* C. L. Koch, 1836, and *Cavator* Blackwall, 1840, and place them on the Official Index of Rejected and Invalid Generic Names in Zoology, and place the generic names *Amaurobius* C. L. Koch, 1837, and *Coelotes* Blackwall, 1841, on the Official List of Generic Names in Zoology."

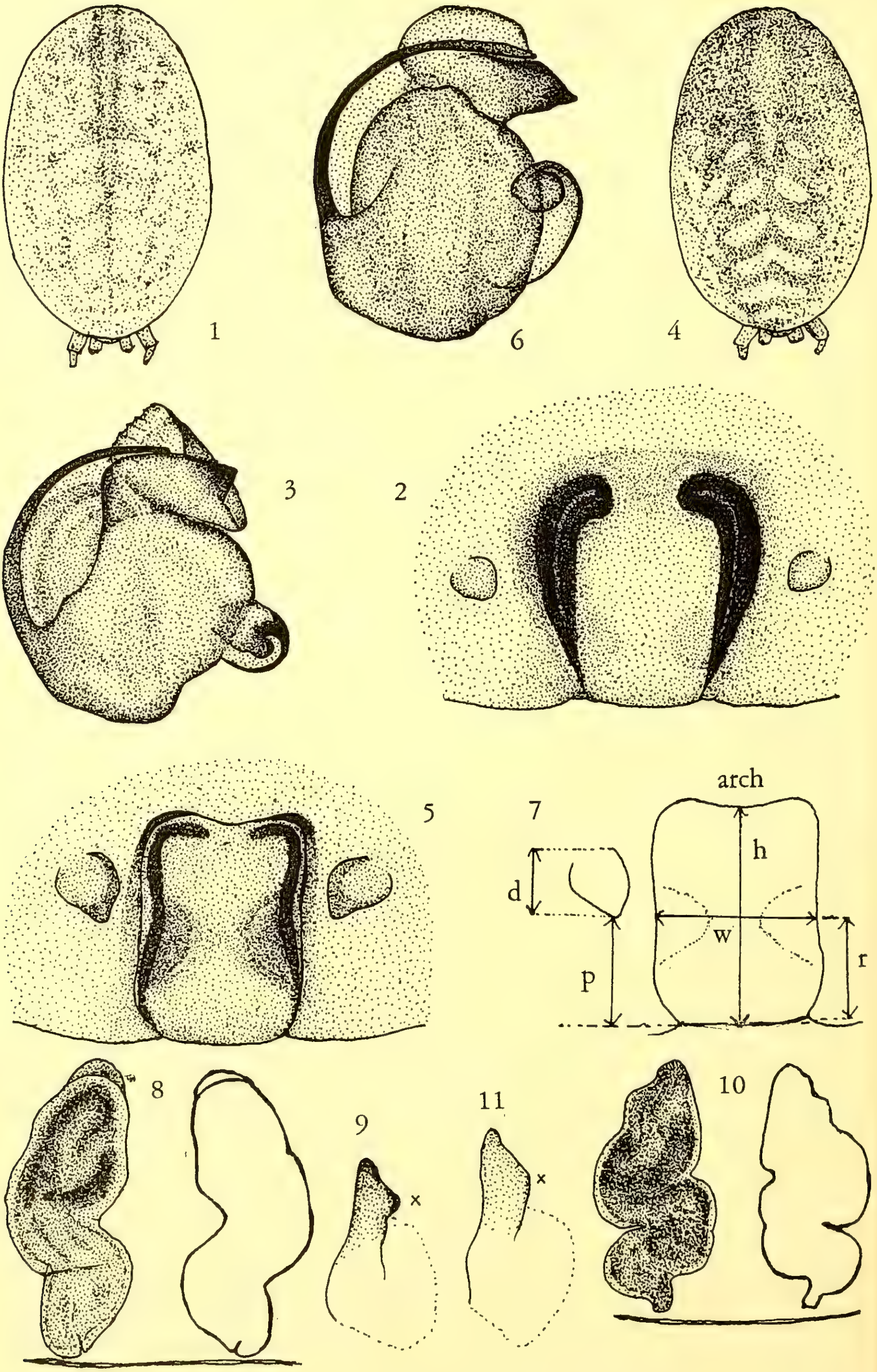
I may remark that *Clubiona saxatilis* Blackwall, 1833, is the type-species (by monotypy) of *Coelotes* Blackwall, 1841. Levi & Kraus follow the current usage of modern authors and consider *C. saxatilis* a synonym of *C. atropos*; consequently they ask the Commission to place *C. atropos* on the Official List. My investigations, however, clearly show that *saxatilis* and *atropos* are different species, so that it must be recommended to place the first mentioned species on the Official List.

I realize that the present conclusion will cause some disturbance in current nomenclature, especially since modern usage seemed to become well-established after the appearance of the works of Locket & Millidge (1953) and Wiehle (1963). The usage of the names *C. atropos* and *C. terrestris* is, however, not as unequivocal as would appear from Bonnet (1956), according to whose bibliography the name *atropos* appears more than 200 times in literature up to 1939, *terrestris* more than 100. These numbers are of little value because identifications often differed in each country and depended upon preference for taxonomic works of the own region. The following general rules for the interpretation of records may be useful.

In England, after the publications of O. Pickard-Cambridge (1879 and 1905) most *terrestris* identifications will prove to be *terrestris* Wider indeed; most *atropos* identifications will be *atropos* auct. (= *saxatilis* Blw.). Misidentifications cannot be excluded: in Pickard-Cambridge's own collection (Oxford) two females are labelled "*terrestris* Wider (*pabulator* Cambr. Simon)"; these proved to be *atropos* auct. (checked by Dr. Locket and Fr. Chrysanthus). All identifications after 1953 (the date of appearance of the book by Locket & Millidge) will certainly correspond with the opinion of these authors.

In France, in the second edition of his "Arachnides de France" (1937, edited by Berland and Fage) Simon states (p. 1036, note) that he himself mixed up the two species "jusque dans ces derniers temps." For this reason all references until 1937 must be considered with some reserve.

In Germany (and the Netherlands), the references to *terrestris* will be *terrestris* Wider; all references to *atropos* will almost certainly bear upon the same species. Bösenberg (1902) mixed up the species and M. Dahl (1931) considered the three species identical. Wiehle, who for the first time in this country clearly


1
6
4
3
2
5
7
arch
h
d
w
r
p
8
9
x
11
x
10

distinguished the species, writes: "... *Coelotes terrestris* (ist) bei weitem die häufigste Spezies. Ich selbst habe *C. atropos* nur einmal gefunden, und zwar im September 1934 in einem Mischwald bei Stolberg (Harz), in beiden Geslechtern adult" (1963 : 290).

When the possibility of avoidance of too much disturbance in nomenclature is also taken into account, there are three ways to solve the problem of the specific names.

(1) The absolutely correct way is to restore the name *C. atropos* in its original meaning, and replace *C. atropos* auct. by *C. saxatilis* Blackwall. It will be easy to collect new material at the type-locality (forêt de Villers-Cotterets, Aisne, about 70 km NE of Paris), and designate a neotype for *C. atropos.*

(2) Suppression of the name *C. atropos,* resulting in conservation of the name *C. terrestris* Wider (= *terrestris* auct.) and introduction of the name *C. saxatilis* Blackwall (= *atropos* auct.). This is a logical solution, excluding the possibility of confusion. In my opinion this way should be preferred. Therefore, in the special part of the present paper below, the names are used in this sense.

(3) Validation under the plenary powers of the name *C. atropos* in the sense of modern authors. This solution is illogical and at complete variance with common sense: it would result in the connection of the name *atropos* with a species that does not occur at the type-locality!

My comparison of descriptions and materials also resulted in the two following conclusions.

(3) The identification of the males is fairly easy: the characters of the patellar apophysis of the palp and the shape of several parts of the bulbus are distinct and almost invariable (cf. Locket & Millidge, 1953, figs. 14, 15; Wiehle, 1963, figs. 113—119; our figs. 3, 6, 9, 11).

(4) None of the characters given for the identification of the females, when considered separately, is absolutely reliable, a fact already revealed by some contradictions between the descriptions by different authors. The following key summarizes these characters. As mentioned above, the names used here are *C. terrestris* Wider (= *terrestris* auct. = *atropos* Walckenaer), and *C. saxatilis* Blackwall (= *atropos* auct. non Walckenaer).

Key to the females

a) abdomen: dark with a lighter longitudinal stripe on the anterior part and distinct lighter chevrons on the posterior part . . . . *terrestris*
— abdomen lighter, a dark stripe runs its whole length, no chevrons *saxatilis*

Figure 1, *Coelotes saxatilis* (Blw.), ♀, abdomen, × 5; 2, idem, epigyne, × 55; 3, idem, ♂, left palp, bulbus, ± from above, × 50; 4, *C. terrestris* (Wider), ♀, abdomen, × 5; 5, idem, epigyne, × 55; 6, idem, ♂, left palp, bulbus, ± from above, × 50; 7, idem, ♀, sketch of the epigyne, × 55 (for the abbreviations cf. text); 8, *C. saxatilis* (Blw.), ♀, vulva, × 65; 9, idem, ♂, left palp, tibial apophysis, outside, × 30; 10, *C. terrestris* (Wider), ♀, vulva, × 65; 11, idem, ♂, left palp, tibial apophysis, outside, × 30

b) epigyne: central part square, with a sharp anterior border (fig. 5) . *terrestris*
— epigyne: central part rectangular, height: width = ± 3 : 2, without this border (fig. 2) . . . . *saxatilis*
c) the sides of the epigyne not or hardly broadened towards the tip (fig. 5) . . . . *terrestris*
— these sides distinctly broadened towards the tip, somewhat shaped like a hockey stick (fig. 2) . . . . *saxatilis*
d) the visible part of the receptacula seminis (fig. 7, r) nearly at the middle of the epigyne . . . . *terrestris*
— this part nearer to the base of the epigyne . . . . *saxatilis*
e) dents on either side of the epigyne (fig. 7, d) larger, placed above the middle of the epigyne . . . . *terrestris*
— dents smaller, placed in the middle of the epigyne . . . . *saxatilis*
f) vulva: (Wiehle, 1963, figs. 111, 112; our figs. 8, 10) receptacula seminis broad, paunchy . . . . *terrestris*
— receptacula more slender . . . . *saxatilis*

TABLE OF THE EXAMINED SPECIMENS

a Q_h	b no	c locality	d arch	e sides	f d	g Q_p	h Q_r	i species
275	GV8	Goyt Valley (N. England)	?	+	2	45	27	*saxatilis*
217	GV10	,,	o	+	2	39	31	,,
217	GV1	,,	o	+	2	46	31	,,
202	C	North England	o	+	2	38	31	,,
202	D	,,	o	+	2	38	23	,,
200	A	,,	o	+	2	42	25	,,
200	GV3	Goyt Valley	o	+	2	42	25	,,
200	GV5	,,	o	+	3	42	25	,,
200	GV7	,,	o	+	3	33	33	,,
200	GV9	,,	o	+	2	50	25	,,
200	CW3	Cord Ward Wood (N. Engl.)	o	+	3	33	25	,,
200	P1	Chaville (France)	?	+	2	50	21	,,
200	P2	,,	o	+	2	41	25	,,
186	GV6	Goyt Valley	o	+	2	39	23	,,
184	CW5	Cord Ward Wood	o	+	2	46	31	,,
183	CW1	,,	o	+	2	36	27	,,
171	CW2	Cord Ward Wood	o	+	2	33	33	*saxatilis*
171	GV4	Goyt Valley	o	+	2	42	25	,,
171	GV11	,,	o	+	2	50	25	,,
171	GV12	,,	o	+	2	42	25	,,
171	5	S.W. England	c	—	4	42	42	*terrestris*
166	393a	Sustenpass (Switserland)	c	—	4	50	40	,,
163	CW4	Cord Ward Wood	o	+	2	46	31	*saxatilis*
157	GV2	Goyt Valley	o	+	2	36	27	,,
157	H	the Netherlands	c	—	4	36	41	*terrestris*
157	G	Göttingen (Germany)	c	—	3	53	42	,,
155	6	North England	o	+	2	43	29	*saxatilis*
155	B	,,	o	?	2	43	36	,,

a Q_h	b no	c locality	d arch	e sides	f d	g Q_p	h Q_r	i species
150	XIV	Erlangen (Germany)	c	—	3	58	42	*terrestris*
150	V	South Limburg (Netherlands)	c	—	3	58	42	,,
143	XV	Erlangen	c	?	3	50	40	,,
143	100a	Diekirch (Luxemburg)	c	—	4	35	60	,,
143	St1	Stolberg (Harz, Germany)	c	—	4	50	40	,,
137	XIII	Erlangen	c	—	4	45	45	,,
137	XI	,,	c	—	3	55	36	,,
137	VI	South Limburg	c	[1])	4	45	36	,,
137	4	North England	c	—	3	55	45	,,
137	St2	Stolberg	c	—	4	45	36	,,
137	St3	,,	c	—	3	55	36	,,
133	II	South Limburg	c	—	3	50	42	,,
125	P3	Les Contamines (France)	?	—	3	60	40	,,
122	P4	,,	c	—	3	45	36	,,
122	III	South Limburg	c	[1])	3	55	36	,,
122	La	Luxemburg	c	—	3	54	45	,,
118	I	South Limburg	c	—	3	62	31	,,
118	IV	,,	c	—	3	61	38	,,
112	XII	Erlangen	c	—	4	33	44	,,
112	L	Luxemburg	?	—	3	55	44	,,
112	Ha	the Netherlands	c	—	3	45	27	,,
111	339	Schwyz (Switzerland)	c	—	4	40	50	,,
111	T	Tschiertschen (Switzerland)	c	—	5	55	50	,,
111	St4	Stolberg	c	—	3	60	30	,,
105	100	Diekirch	c	—	4	40	40	,,
100	VII	South Limburg	c	—	3	44	44	,,
100	393	Sustenpass	c	—	3	45	36	,,

[1]) (row e) = no annotations

As the shape of the central part is the most striking difference of the epigynes of the two species I measured the epigynes of 55 specimens and expressed these measurements in a quotient $Q_h = \frac{h}{w} \times 100$; h = height of the epigyne, w = its width, taken at the centre of the receptacula which are visible under the paler median part (cf. fig. 7, r). I have arranged the specimens in descending progression of this Q (see table, rows a, b, c).

I have further added notes on (a) the anterior border of the epigyne ("arch", row d): o = open; c = closed; (b) the shape of the sides (row e): + = broadened towards the tip; — = not broadened towards the tip; (c) the width of the dents (row f, 1 = 0.05 mm).

Moreover I have added the following quotients:

$Q_p = \frac{p}{h} \times 100$; p = distance of the posterior side of the dents from the posterior rim of the epigyne (row g);

and $Q_r = \frac{r}{h} \times 100$; r = distance of the centre of the visible part of the receptacula from the posterior rim of the epigyne (row h).

In all these quotients a higher number indicates a more anterior position of the part in question. Several numbers repeatedly occur: this is partly due to the fact that I have rounded off all measurements to 0.05 mm and multiples of it.

Critical discussion of the usual characters (a—f, p. 67)

The first-mentioned character (a), the pattern of the abdomen, may often be decisive but sometimes a decision will be impossible, as already was indicated by LOCKET & MILLIDGE (1953 : 20).

The shape of the epigyne (b; table: row a) is often useful. So, if h is more than $1\frac{3}{4} \times$ w, it is *C. saxatilis*. If h is less than $1\frac{1}{2} \times$ w, it is *C. terrestris*; there is a gradual transition. The absolute width of the central part of the epigyne (w) is not decisive: in *terrestris* it varies from 0.30—0.55 mm (average of 25 specimens 0.40 mm); in *saxatilis* it varies from 0.20—0.50 mm (average of 22 specimens 0.33 mm).

It seems that the anterior border of the epigyne ("arch", row d) should be decisive, but in a few specimens a decision is not easy.

The shape of the sides of the epigyne (c; row e) is often useful, but in some specimens of *terrestris* the sides are somewhat broadened at their tips and in a few specimens a decision is quite impossible (nos. B, XV).

The measurements of the dents (e; row f) are of little use: 0.1 mm is always *saxatilis*, 0.2 mm is *terrestris*, while 0.15 mm may belong to both species.

The position of the dents (e; Q_p : row g) and that of the receptacula (d, Q_r : row h) cannot be used, as clearly appears from the random distribution of the numbers.

The shape of the vulva (f) is certainly different in the two species, but I doubt whether an unambiguous judgement is possible without comparison with the vulva of the related species.

An examination of other characters mentioned by some authors proved that these are altogether unreliable, as e.g., the diameter of the eyes and their mutual distances (KULCZYNSKI), the sides of the epigyne straight or curved, parallel or divergent to the top.

I studied the relative length of the legs, often a very useful character, without result. Then I turned to the spines: after having drawn the four legs of the left side seen from the front and from behind (of the two species), it seemed to me that I had discovered a few spines in *saxatilis* that were absent in *terrestris*; a comparison of the right legs already diminished the differences. When, furthermore, I examined a second couple the few spines "characteristic" for *saxatilis* were missing in *saxatilis* but present in *terrestris*! L. MULLER (1952) has already drawn attention to the large degree of variability in the number of spines in these species.

The conclusion from the foregoing must be that the identification of the females of the two species cannot be based on a dichotomous key, but that often several characters should be taken into consideration simultaneously: then certitude will always be obtainable.

The species occurring in the Netherlands is *C. terrestris*; VAN HASSELT (1886 : 33) and CHRYSANTHUS (1951 : 99; 1954 : 19) used the name *atropos*; in CHRYSANTHUS (1963 : 18) the correct name is used.

REFERENCES

BLACKWALL, J., 1833, Lond. Phil. Mag. Journ. Sci. [3] 3 : 436—443.
———, 1861, A History of the Spiders of Great Britain and Ireland, London (Ray Society).
BONNET, P., 1956, Bibliographia Araneorum 2 (2), Toulouse.
BÖSENBERG, W., 1902, Die Spinnen Deutschlands, Zoologica, Stuttgart 14 (35).
CHRYSANTHUS, P., 1951, Natuurhistorisch Maandblad Maastricht 40 : 97—100.
———, 1954, Nederlandse Spinnen, Wetenschappelijke Mededelingen K.N.N.V. 13.
———, 1963, idem, 2nd edition.
CHYZER, C. & W. KULCZYNSKI, 1897, Araneae Hungariae 2 (2), Budapest.
DAHL, M., 1931, Die Tierwelt Deutschlands 23, Jena.
HASSELT, A. W. M. VAN, 1886, Catalogus Araneorum hucusque in Hollandia inventorum, Hagae Comitis (= Tijdschr. v. Entom. 28, 29).
KULCZYNSKI, W., 1906, Bulletin International de l'Académie des Sciences de Cracovie 1906 : 417—476.
LESSERT, R. DE, 1910, Catalogue des Invertébrés de la Suisse 3, Araignées, Genève.
LEVI, H. W. & O. KRAUS, 1964, Bull. zool. Nomencl. 21 : 150—153.
LOCKET, G. H. & A. F. MILLIDGE, 1953, British Spiders 2, London.
MULLER, L., 1952, Bulletin de la Société des Naturalistes Luxembourgeois (1951): 26—35.
PICKARD-CAMBRIDGE, O., 1879, The Spiders of Dorset, 1, Dorchester.
———, 1905, Proc. Dorset Nat. Hist. Field Club 26 : 40—74.
ROEWER, F., 1954, Katalog der Araneae 2a, Bruxelles.
SIMON, E., 1875, Les Arachnides de France. 2, Paris.
———, 1937, idem, 2nd edition 6 (5), Paris.
WALCKENAER, C. A., 1830, Aranéides, in Faune française, Paris 27 : 97—175.
———, 1837, Histoire naturelle des Insectes, Aptères 1, Paris.
———, 1842, idem, 2, Paris.
WIDER, F., 1834, Museum Senckenbergianum 1 : 195—282.
WIEHLE, H., 1963, Zool. Jahrb., Systematik 90 : 227—298.

Entomologische Berichten

De *Entomologische Berichten* worden eveneens door de Nederlandsche Entomologische Vereeniging uitgegeven en zijn bestemd voor de publicatie van kortere artikelen, van faunistische notities etc., alsmede van de Verslagen der Vergaderingen en van mededelingen van het Bestuur. Zij verschijnen twaalf maal per jaar in een aflevering van 16 of meer bladzijden. Deze 12 afleveringen vormen samen een deel.

Trichopterorum Catalogus

De Trichopterorum Catalogus van F. C. J. Fischer wordt door de Nederlandsche Entomologische Vereeniging voor rekening van de auteur uitgegeven. De eerste vijf delen verschenen in 1960—1964. In totaal worden het 15 delen. Alle bekende recente en fossiele soorten van de gehele wereld met hun synoniemen worden er in behandeld. Van alle genera worden de type-soorten aangewezen en de literatuur zal van 1758 tot eind 1960 met de geografische verspreiding vermeld worden. Delen I en II kosten *f* 39,— per stuk, delen III—V: *f* 45,—. Van alle delen zijn ook éénzijdig bedrukte exemplaren beschikbaar. De prijsverhoging hiervoor bedraagt *f* 2,50.

Alle zakelijke correspondentie betreffende de Vereeniging te richten aan de Secretaris, W. Hellinga, Weesperzijde 23II, Amsterdam-O.

Alle correspondentie over de redactie van het Tijdschrift voor Entomologie te richten aan de Redacteur, Dr. A. Diakonoff, Rijksmuseum van Natuurlijke Historie, Leiden.

Alle correspondentie over de redactie van de Entomologische Berichten te richten aan de Redacteur, B. J. Lempke, Oude IJselstraat 12III, Amsterdam-Z. 2.

Alle betalingen te richten aan de Penningmeester, Drs. H. Wiering, Doorntjes 29, Bergen (N.H.), postgiro 188130, ten name van de Nederlandsche Entomologische Vereeniging te Bergen (N.H.).

Alle correspondentie betreffende de Bibliotheek der Vereeniging te richten aan de Bibliotheek, Zeeburgerdijk 21, Amsterdam-O.

Notice to Subscribers

All correspondence referring to subscriptions and exchange of the periodicals of the Netherlands Entomological Society should be addressed to the Librarian, Zeeburgerdijk 21, Amsterdam-O, Netherlands.

NOTICE TO CONTRIBUTORS

Contributors will receive free of charge fifty reprints of their papers, joint authors have to divide this number between them at their discretion. Additional reprints may be ordered when returning proofs.

Manuscripts should be written in Dutch, English, French, German or Italian. If they contain descriptions of new genera, species, etc., they should be in one of the four last mentioned languages.

The author should communicate with the editor before submitting his manuscript. He will enclose with manuscript a Synopsis (Abstract), styled according to recommendations of the UNESCO (style rules will be provided by the editor) and, if needed, a Summary. Papers in Dutch should contain an Abstract and/or a Summary in one of the four other languages.

Manuscripts should be typewritten in double spacing on only one side of the paper, with a margin of at least three cm at the left side of each sheet. Paragraphs should be indented. Carbon copies cannot be accepted, as handling makes them illegible.

Captions for text figures and plates should be written on a separate sheet in double spacing, numbered consecutively in arabic numerals; the use of a, b, c, or any other subdivision of the figure numbering should be avoided.

Drawings for reproduction should be on good paper in Indian ink, preferably at least one and a half times as large as the ultimate size desired. Lettering should be uniform, and, after reduction, of the same size. Photographs should be furnished as shiny positive prints, unmounted. Plates should be arranged so as to fill a whole page (11.5 x 19 cm) of the *Tijdschrift,* or a portion thereof, captions included. Combinations of illustrations into groups are preferable to separate illustrations, since there is a minimum charge per block.

Names of genera and lower systematic categories, new terms and the like are to be underlined by the author in the manuscript by a single straight line. Any other directions as to size or style of the type are given by the editors, not by the author. Italic type or spacing to stress ordinary words or sentences is to be avoided. Dates should be spelled as follows: either "10.V.1948" or "10 May, 1948". Other use of latin numerals should be avoided, as well as abbreviations in the text, save those generally accepted. Numbers from one to ten occurring in the text should be written in full, one, two, three, etc. Titles must be kept short. Footnotes should be kept at a minimum.

Bibliography should no be given in footnotes but compiled in a list at the end of the paper, styled as follows:

Mosley, M. E., 1932, "A revision of the European species of the genus *Leuctra* (Plecoptera)". — Ann. Mag. Nat. Hist. [10] 10 (3): 1—41, pl. 1—5, fig. 1—57. Number of issue should only be added (in parentheses) when it has individual pagination.

Text references to this list might be made thus:

"Mosley (1932) says...." or "(Mosley, 1932)".

The editors reserve the right to adjust style to certain standards of uniformity.

Manuscripts and all communications concerning editorial matters only should be sent to: Dr. A. Diakonoff, Rijksmuseum van Natuurlijke Historie, Leiden, The Netherlands.

DEEL 108 AFLEVERING 4 1965

TIJDSCHRIFT VOOR ENTOMOLOGIE

UITGEGEVEN DOOR

DE NEDERLANDSCHE ENTOMOLOGISCHE VEREENIGING

INHOUD:

Tijdschrift voor Entomologie, deel 108, afl. 4. Gepubliceerd 30-VII-1965

Nederlandsche Entomologische Vereeniging

De contributie voor het lidmaatschap bedraagt f 15.—, voor student-leden f 2.50, per jaar. — Begunstigers betalen jaarlijks tenminstet f 15.—.

De leden, behalve de student-leden, ontvangen gratis de *Entomologische Berichten*, waarvan de prijs voor student-leden f 1.50 per jaar, voor niet-leden f 20.— per jaar en f 2.— per nummer bedraagt.

De leden kunnen zich voor f 10.— per jaar abonneren op het *Tijdschrift voor Entomologie*; hiervan bedraagt de prijs voor niet-leden f 35.— per jaar.

De eerder verschenen publicaties der Vereeniging zijn voor de leden tegen verminderde prijzen verkrijgbaar. De Vereeniging geeft de volgende publicaties uit.

Monographieën van de Nederlandsche Entomologische Vereeniging

Deze worden met onregelmatige tussenpozen uitgegeven. Er zijn reeds verschenen:

— F. T. Valck Lucassen et al. — Monographie du genre Lomaptera Gory & Percheron (Coleoptera, Cetoniidae), prijs f 50.—.

1. A. J. Besseling. — De Nederlandse Watermijten (Hydrachnellae Latreille, 1802), prijs f 25.—.

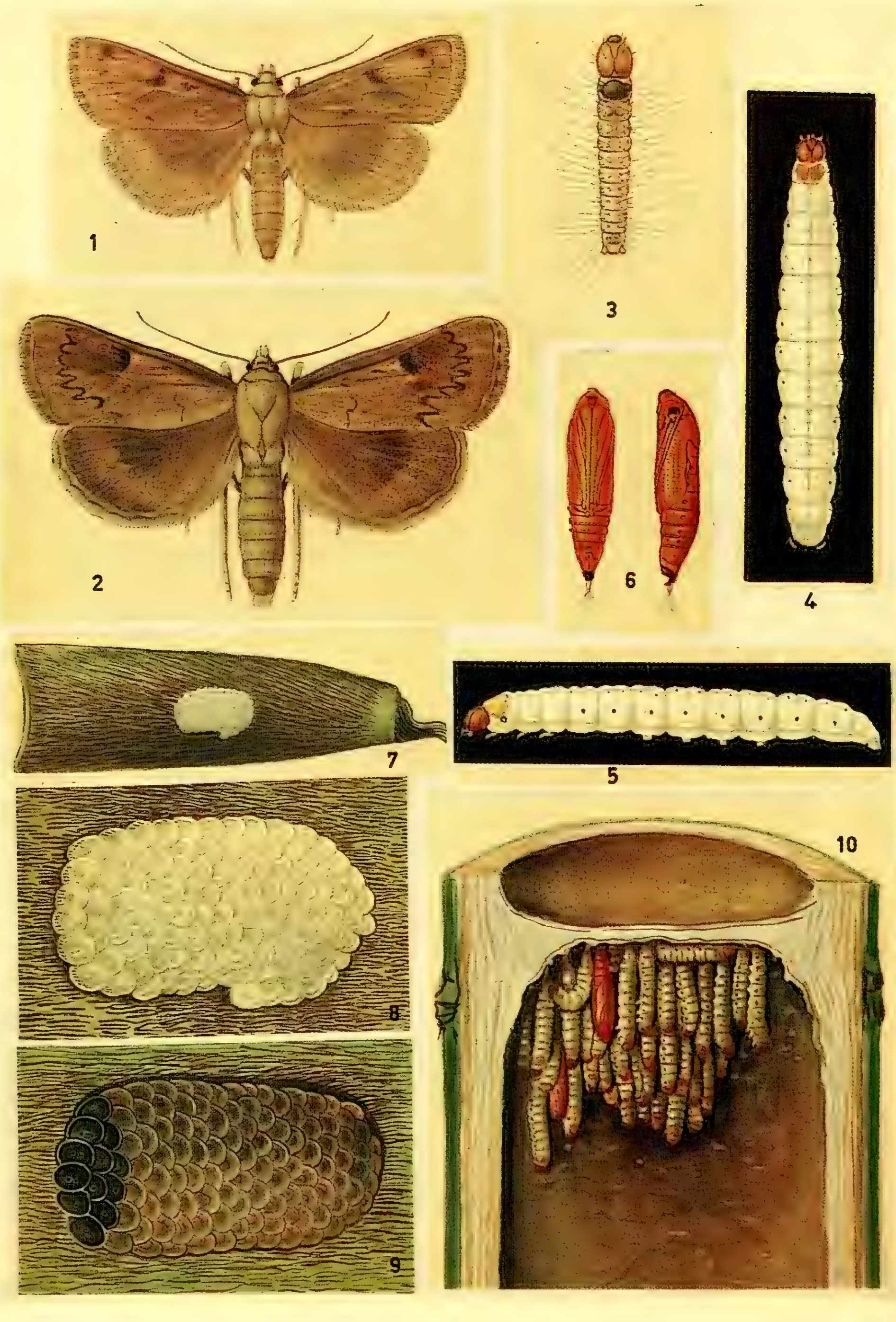


Fig. 1—10. *Chilo fuscidentalis* Hamps., Bamboo Sprout Borer of West Java. 1—2, ♂ and ♀ (× 3/2); 3, 1st instar larva (× 10); 4—5, full grown larva (× 3); 6, pupa (× 1.5); 7, batch of eggs on bamboo sprout; 8, the same, much enlarged; 9, the same ready to hatch, the first rows parasitized; 10, larvae in process of pupation in top of a sound bamboo joint (× 3/4) (Water colours by Indonesian artists, Bogor, 1943)

L. G. E. KALSHOVEN : *Injurious Lepidoptera from Java*

NOTES ON SOME INJURIOUS LEPIDOPTERA FROM JAVA

L. G. E. KALSHOVEN

Blaricum, Netherlands

Abstract

The first of the following four papers treats the biology of two species of Hepialidae, *Hepialiscus* (*Palpifer*) *sordida* (Snellen) and *Endoclita* (*Phassus*) *sericeus* (Swinhoe) in Central Java. The first species lives in tubers and other subterraneous parts of monocotyl plants, the second species is a ring borer. The second paper presents a survey of the biology of several Indomalayan wood-boring Cossidae and bark-feeding Squamuridae (Arbelidae) forming an addition to ROEPKE's monograph "The Cossids of the Malay Region" (1957). *Zeuzera indica* Herrich-Schäffer and *Xyleutes strix* L. are treated in detail, while other species of these two genera and of *Cossus, Phragmataecia*, and *Squamura* are dealt with briefly. A summary is given of various modes of life and association of some groups of species with respective host plants. The third paper gives the remarkable biology of two Pyralid bamboo borers: *Chilo fuscidentalis* Hampson, gregarious larvae of which cause characteristic injury to sprouting bamboo culms in West Java, and *Eschata chrysargyrea* Walker, boring in young bamboo in Central Java. Finally, the fourth paper is a note on the biology of *Amphitales episcopopa* Meyrick (Aegeriidae), a bark borer of *Actinophora fragrans*.

INTRODUCTION

The four papers published in this issue have no other connection with each other than their being the result of the author's work as forest entomologist of the former "Instituut voor Plantenziekten" at Buitenzorg (Bogor), Java.

The data of the first two papers have been mainly collected at a field station for forest entomological research in the teak area near Gedangan, a village in the Semarang District, Central Java.

The paper on the bamboo Pyralidae is largely a compilation of data collected by Indonesian personnel during the Pacific War.

Provisions of the UYTTENBOOGAART-ELIASEN STICHTING, Amsterdam, have been of great help in preparing the papers and for financing the colour plate.

1. BIOLOGY OF TWO SPECIES OF HEPIALIDAE

Hepialiscus (Palpifer) sordida (Snellen)

In my book on the pests of Indonesian crops (1951) I have shortly characterized this species as a borer found at some depth in the soil in tubers of *Dioscorea, Alocasia*, and *Amorphophallus*. On my request the personnel of the field station at Gedangan took considerable pains to unearth a number of the larvae for observations and breeding experiments in 1933—1934. The following main data are extracted from their field notes, arranged according to the host plants.

Dioscorea alata L. (Dioscoreaceae) ("uwi brongkol"), growing either wild or

semi-cultivated, producing a tuber fairly deep in the soil. The tuber contains an itching substance but can be consumed when properly prepared. From these plants ten borer specimens were collected; seven nearly mature larvae, 25—30 mm in length, were moved to a fresh piece of tuber; six pupae were finally obtained from which four moths emerged.

D. pentaphylla L., ("katak"), a seldom cultivated plant. A single larva, 20 mm, was found which soon succumbed.

Alocasia macrorrhiza Schott (Araceae), ("senthé"), has a thick edible stem. From subterranean parts 30 larvae could be collected; seven moths emerged in the laboratory. Besides, from 245 apparently infested plants, transplanted in a large outdoor cage on September 21st, 40 moths were obtained between October 25 and November 15. One couple copulated in the cage on October 31st.

Gloriosa superba L. (Liliaceae), ("mondoliko"), with the rhizome containing a poisonous alcaloid. A single larva, 25 mm, was found in the stem.

Another larva, 20 mm, was collected in "kaeroet", the latin name of which plant could not be traced.

A portion of an *Amorphophallus* sp. (Araceae), was received at Bogor from Madiun, April, 1939. It harboured in the core the whitish caterpillar of *Hepialiscus* which pupated in a white felty cocoon speckled with dirt and yielded a moth (Dr. C. J. H. FRANSSEN).

The female which mated October 30—31 produced 467 black, granular eggs on November 1—2. They were kept in a humid atmosphere and hatched on November 15—18, the first stage larvae being 2 mm in size. Some 35 specimens were placed on November 20 in *Dioscorea* tubers which were punched previously. Four pupae developed after 6—8 weeks, one of which produced a moth. Some 100 first stage larvae were placed on *Manihot* roots for food, and several of them reached a size of 14—23 mm but none reached the pupal stage. The life cycle may take some three months only.

The larval galleries encircle the tubers and stems in *Dioscorea* and *Alocasia* and have a reddish colour.

The moths bred from early stages emerged in the field laboratory in the months January, February, July, August, and October. In two observed cases the moths emerged at 4 p.m.

Palpifer sexnotatus var. *ronin* Pfitz is recorded in Formosa to attack subterranean parts of *Colocasia antiquorum* var. *esculenta* and kill the plant (*Rev. Appl. Entom.* 1938 : 517). This record confirms the experience that particular hosts of *Hepialiscus* species are Monocotyledonous plants.

Endoclita (Phassus) sericeus (Swinhoe)

In the course of forest entomological research in the environment of the field station at Gedangan a fairly known species of Hepialid collar-borer or ring-borer of various woody plants in Java and Sumatra was also found in the teak cultivations. In 1932—1934 some observations were made and experiments carried out in the field and in the laboratory to fill certain gaps in our knowledge of the species. A short life history of the borer, then called "*Phassus ?damor* Moore", was given in my handbook (1951). The moth has a rather variable wing pattern. It was

Text fig. 1. Moth of *Endoclita sericeus* Swinh. in resting position (after ROEPKE)

finally identified as *Endoclita sericeus.* A more complete account of the data on its life history is given below.

Rearing young larvae brought from the field in their tunnels appeared unsuccessful without special provisions. However, larvae of over 20 mm could be raised to moths when the roots of the host plant were kept in water. Some success was also obtained when medium sized larvae were moved from their tunnels to pieces of green *Manihot* roots, provided this material was changed at frequent intervals. The adults appeared to be nocturnal, resting during the day, hanging by the hairy front and middle legs from some projected part of a plant, the wings folded loosely round the body (text fig. 1); they resembled a withered leaf or a large hairy spider.

Copulation could not be induced in captivity, not even when the insects were released in a spacious cage in the forest. Accidentally a pair in copula was found elsewhere; the female hanging in the usual way from the tip of a leaf, the male resting in opposite position head downwards, with tips of the abdomens connected. The pair made the impression of a long crumpled dry leaf. But this was in a place far from the laboratory and no eggs could be secured. PHILLIPS (1938) described a similar mating of a *Phassus* species in Ceylon.

In Gedangan eggs were obtained in numbers on the bottom of the outdoor cage, well stocked with moths of both sexes. The eggs had the form of small, white granules soon turning black: however they did not hatch, apparently having been dropped by unfertilized females. So no larvae could be obtained at the laboratory from eggs. But, fortunately, very young larvae were discovered in the field, hiding in small tunnels, in dead, more or less rotten twigs, mostly of *Lantana*, among the litter near the forest border. These larvae were very slender, cream-coloured, 7—10 mm long and 1 mm broad. The entrance of their narrow tunnel was sealed off with faecal pellets and other tiny particles spun together. It may therefore be assumed that fertilized moths strew their eggs while swarming (as do other *Hepialidae*), and that the first stage larvae find shelter and food in dry twigs. This feeding of the borer in its earliest larval stage on saprophytic matter is an interesting feature in the ecology of the species.

Apparently the young larvae soon move to living plants in the immediate vicinity, burrowing in stems and stalks, 1—6 cm in diameter, near the collar of the plant, but not seldom also higher up. They bore a horizontal, circular or spiral gallery into the bark and sapwood, in addition to making a tunnel for hiding in the core, often downwards into the root or upwards in the stem or in both directions simultaneously. The ring-shaped feeding place is enveloped in close-spun silk, to the outside of which faecal pellets and particles severed from the bark are attached. The plant often reacts to the damage by growing a collar of wound tissue on the upperside of the circular wound, and this, in connection with the frequently puffy

web of the larva, may form a wide cuff around the base which may nevertheless remain inconspicuous due to its being covered with debris. During the day the larva hides in the tunnel, venturing outside its burrow at night to feed on the bark and callus and to repair or enlarge its web. It quickly withdraws into its tunnel on the slightest disturbance. Larvae removed from their shelter are very lively showing themselves particularly apt in moving backwards. At this stage the larva is greyish to blackish while the protrusions on the segments are of a lighter hue. The larvae are mainly characterized by a strongly sclerotized thoracic segment, provided with a deep pit (sense organ?) on each side. Growth is rapid according to observations in the field: the larvae reach 15—30 mm by March, 45—60 in May-June, and 50—75 mm in September-October, when they are 6—9 mm thick and ready to pupate.

Pupation takes place in the tunnel which is closed with a membrane resembling the web of a cavity-dwelling spider. The pupa is rough anteriorly while the abdominal segments have rings of small spines. When the moth is ready to hatch the pupa wriggles outwards until it projects halfway through the opening.

The emergence of the moth takes place in the afternoon and at dusk. About 4.30 p.m. the pupa may begin to move and show itself at the opening of the tunnel. It retreats immediately at the slightest alarm. When undisturbed, it takes the moth some 15—30 minutes to burst the pupal skin and free itself, soon taking the characteristic resting position. At 6.15—6.45 the moths start swarming. The appearance of the adults occurs from the end of October till mid February, most frequently in the month of December. Although the moths are not able to take any food, they can be kept alive indoors for 9 or even 12 days.

In rather thick stems of soft wood the wood is eaten away by the larvae near the entrance of the tunnel, a funnel-like cavity being formed, while in some cases in smaller plants the whole of the root base is destroyed. In plant species that have strong regenerative capacity (i.e., abundant callus formation), the circular incisions will be found at a considerable depth. The shelter tunnels may attain a maximum length of 35 cm but are usually shorter. A stem may be attacked by several larvae simultaneously (up to four have been observed in a *Crotalaria* stem, four cm in diameter) and in these cases the rings occur at some height above soil-level. On one occasion a gallery was observed 90 cm above the soil in a *Lantana* stem, 5½ cm thick. The borer rarely attacks trunks of big trees, but has been found in a *Schima noronhae*, 40 cm in diameter, 40 cm above the soil. It is possible, however, that the borer in these cases originally inhabited a creeper and later entered the trunk for the purpose of making a proper shelter tunnel.

The borer attempts its attacks apparently indiscriminately on a very great variety of plants in the field, but it depends on the properties of the hosts whether it can complete its life cycle. The borer does not reach the final stage if the tissues of the host are too hard to allow the excavation of a deep feeding gallery and good shelter tunnel or if the plant succumbs too rapidly as a result of the girdling. Saplings of *Altingia excelsa*, for instance, in West Java forest plantations, are often attacked but their bark is thin, the wound tissue too scanty, and the wood too hard. This species, therefore, is unsuitable as a host-plant of *Endoclita.* Full development of the borer has been observed in the teak area most frequently in *Lantana*, often

in saplings of teak (*Tectona*), occasionally in those of *Actinophora*, *Dillenia*, and *Macaranga*, and in several large shrubs as *Allophylus*, *Bridelia*, *Glochidion*, *Grewia*, *Leea*, and *Stachytarpheta*, as well as once in *Pandanus*. *Lantana* plants (*Lantana* was originally introduced into Indonesia from abroad but has since proliferated and now covers stretches of fallow land) appear to offer exceptionally good breeding places to *Endoclita*. Scores of larvae at different stages of development have been collected from *Lantana* stems in the neighbourhood of the field laboratory. Apparently abortive galleries of the borer have been found in the teak area in *Schleichera* and *Caesalpinia*. In reafforestations on the mountain slopes successful attacks of the ring-borer have been recorded in saplings of *Aleurites*, *Bischofia*, *Bixa*, *Glochidion*, *Trema*, and *Tristania* and along the skirts of the forest in *Eupatorium pallescens* and again in *Lantana camara*. Of the plants and trees on the estates and in native gardens *Cinchona*, *Crotalaria*, *Durio*, *Ricinus*, and cassava (*Manihot utilissima*) (Pl. 8 fig. 4) are suitable hosts. A successful infestation of the borer was once observed in a young *Jacaranda* tree in the Bogor Botanical Gardens. Typical traces of incomplete attacks by the ring-borer have been found in *Coffea* and *Thea* which are presumably unsuitable host-plants and in *Albizzia*, *Erythrina*, *Datura*, and *Rosa* which may indeed serve as true hosts.

No parasites of the borer have been observed and only very occasionally a predatory enemy, viz., woodpeckers. The main limiting factor against the spread of the borer may be that only a small percentage of the dispersed eggs fall in places conducive to development, while the very young larvae are exposed to numerous dangers as long as they are in search of a hiding place or host-plants and must be an easy prey for ants and other predatory species.

The best method of protecting young plantations against an invasion of the borer might be the removal of *Lantana* and *Eupatorium* thickets and accumulations of litter along their borders.

2. BIOLOGY OF INDO-MALAYAN COSSIDAE AND SQUAMURIDAE

COSSIDAE

Cossus subfuscus (Snell., 1895). In an early publication of 1893, quoted by HEYNE (1950), it was stated that "peté" trees, *Parkia speciosa* (Leguminosae), suffer from borers and die prematurely when grown below 150 m altitude. This investigation had not been verified at the time, but in 1918 I observed that Cossid larvae were regularly found in peté trees at Bogor. They bore holes immediately under the outer flakes of the bark in the inner bark and sapwood. The same observation was made near Subah (East of Pekalongan) and, in 1923, in Purworedyo, Central Java. From the larvae at Bogor a few moths were bred which appeared to be identical with "*Trypanus*" *subfuscus* Snellen in the Leiden Museum (det. KALSHOVEN, 1921). In 1927 report was received from Purwakarta in West Java about die-back of peté trees. The insects submitted consisted in part of the reddish larvae of *Cossus*, in part of the larvae of *Xystrocera globosa*, a secondary Cerambycid. In June, 1940, the horticultural officer of Sidoardyo in East Java reported about the dying of peté trees, the bark of which had turned black as if scorched by fire. In a sample of damaged bark, again, *Cossus* larvae were found.

Most probably the borer will be present in peté trees in other parts of Java and elsewhere in Indonesia. However, its occurrence easily escapes attention. The bark of the trees is rather rough, and the larvae produce little frass. They appear, when small in number, not to affect the health of the trees. It may be that an abnormal increase of this number by causes still unknown has harmful effects and that in this case secondary borers, like longicorns, are attracted to the weakened trees and hasten the process.

C. pusillus Roepke, 1957. The original data on the labels of ROEPKE's paratypes, not quoted by him, indicate that the moth borer was found in the trunk of *Diospyros kaki* (Ebenaceae) ("batang kesemek") near Garut, at 800 m, in West Java, Aug., 1926.

Zeuzera indica Herrich-Schäffer, 1854 (syn.: *Z. postexcisa* Snell., 1900 nec Hamps.). ROEPKE (1957) has cited my first discovery of the larva of this large species in galleries at the base of a huge *Phoebe excelsa* (Lauraceae) ("huru leuheur"), in virgin forest on the South slope of Mt. Gedé, 1000 m, West Java (KALSHOVEN, 1919). This find should be dated Tjiparai, January, 1917. Since then the occurrence of the borer in Lauraceous trees has been noticed several times, as shown by the following field notes.

March, 1921, a specimen of the moth bred from a "sintok" (*Cinnamomum* species, particularly *C. burmanni* and *C. iners*) found in a 5-year old forest plantation at Tjiguha, Djampang District, West Java. — June, 1922, a specimen of the borer found in "adem ati" (*Litsea chinensis*) collected in the teak forest of Padas, Semarang District, Central Java. The moth emerged in August. — November, 1923. A consignment of borer-infested material, received from Rambipudyi, Besuki, East Java, included a portion of a "buru semut" (Lauraceous tree) containing several galleries. A Cossid larva still present among the frass, soon succumbed. — October, 1930. Five larvae collected from *Litsea chinensis* trees in the teak forest of Manggar, Semarang district. Only a single malformed pupa was obtained from the material. — 1932. During extensive investigations of Cossid borers by the Javanese personnel of the field station at Gedangan some 40 infestations of *Z. indica* in *Cinnamomum* trees ("sintok") and 80 in *Litsea chinensis* ("adem ati") were collected; several moths were bred. — July, 1953. An infested "huru manuk" (Lauraceous tree) found in a neglected plantation near Leles, East Priangan, West Java. The large faecal pellets were similar to those of *Z. indica* (see below).

These records show that the species is more common in Java than ROEPKE assumed. Presumably it is equally common in Malaya and Sumatra. In a paper by RIDLEY (1896 : 116) I found the note: "The chief enemy of cinnamoms here [in Malaya] is a very common borer, a red caterpillar which burrows into the stem. It attacks ... chiefly ... the wood of full grown trees". In a study of the forest flora of Sumatra F. H. ENDERT (1925, *Tectona* 18) mentions that large larvae make tunnels in the trunks of Lauraceae in Simelungun and the Karo Lands, causing much trouble when one tries to exploit the timber which often is of good quality in other respects.

The caterpillar is reddish-purple with dark spots (small chitinous disks) on the dorsal side, the ventral side being yellow-white; a dark streak along the front of the pronotal shield broadening at the corners; up to 6 cm in length and 12 mm broad. Sometimes the larva gives off a distinct sourish smell.

Among the hosts observed in the teak woods at Gedangan only *young* "sintok" and "adem ati" trees could be found. The borer's presence could be detected by accumulations of round and coarse faecal pellets (Pl. 7 fig. 2), up to 7 mm in diameter and composed of undigested wood particles, between the buttresses of the infested tree. There is a round hole in the base of the trunk 1—10 cm above the soil, where the trunk of young "sintok" is 10—35 cm, that of young "adem ati" 6—30 cm. The hole leads to tunnels of different dimensions in the trunk and in the main roots, the former sometimes ascending close to one another in which case they probably have been made by one and the same borer specimen at different periods of its development. The total length of the tunnels amounts to several decimeters. The wall of new sections is brown or reddish; that of older sections is black. These particulars differ considerably from those given by BEESON (1941) for the galleries of *Z. indica* in *Litsea polyantha* in India which are alleged to resemble the tunnels of a *Xyleutes* species.

The ejection of faecal pellets, numbering 10—20 daily, is carried out rather regularly. The pellets disintegrate during rainy weather; the saw dust accumulations are soon hollowed out from below by termites. When the ejection of pellets ceases this may be the sign that the larva is preparing for pupation; it then bores a new hole to the outside which is situated immediately above the old hole and is kept closed by a thin outer layer of bark. Pupation takes place behind a protective web.

Larvae of varying size have been found in one and the same tree, and nearly mature specimens or pupae at different seasons of the year, though they were more numerous in the period of February to April. The latter fact, however, may be due to a particularly extensive search during this period, and no well-defined periodicity has become apparent in the borer's development. When exposed in its gallery the larva starts to close the opening with silk.

The pupal stage lasts for 4 to 5 weeks, the moths emerging in the afternoon between 1 p.m. and 7 p.m. The males are not attracted by the females at any great distance. The life cycle is estimated to last at least one year.

Wood peckers succeeded in extracting the borer in only four out of some 80 infestations observed in "adem ati" trees; no traces of their activities were found in the borer attack on "sintok". It happens far more frequently that, apparently without reason, the ejection of pellets ceases from a hole, originally inhabited. After having been opened these galleries proved to be empty or contained only the remnants of a dead larva or pupa. Once a predatory ant (*Pheidole* sp.) was found in an abandoned tunnel. Termites had entered the gallery in many cases and filled it with soil. It is very doubtful, however, whether the termites do any harm to the borer, no matter how readily they enter holes in the trunks, especially those close to the ground. The attempts to breed the moth in the field laboratory from infested parts of the holes inhabited by a mature borer and planted in containers and kept moist, were often unsuccessful and only produced a dead or malformed pupa. The pupal stage, apparently is rather vulnerable.

Z. coffeae virens Toxopeus, 1948. In my papers of 1919 and 1940 I have elaborated on the habits and life history of the "red branch borer". There only remains to give an additional list of its foodplants and to compile the notes on its diseases and parasites.

Alphabetical list of hosts observed in the years 1920—1940

Acalypha hispida
Albizzia procera
Annona muricata
Antidesma bunius
Bixa orellana
Bridelia sp.
Brucea amarissima
Cassia fistula
Ceiba pentandra
Citrus sp.
Crotalaria anagyroides
Derris macacranta
Eugenia sp. ("djambu")
Gossypium obtusifolium
Graptophyllum pictum
Hibiscus cannabinus
Hibiscus rosasinensis
*Hydnocarpus wightiana**)
Indigofera suffruticosa
Lantana camara
Mallotus repandus
Manihot utilissima
Olax scandens
Peronema canescens
Persea gratissima
Psidium guajava
Pterospermum sp.
Santalum album
Stachytarpheta mutabilis
Swietenia macrophylla
Thespesia lampas

*) recorded for Malaya by MILLER (1941)

With 20 names mentioned in an earlier publication (KALSHOVEN, 1919) this sums up to 50 host plants found in Java. BEESON (1941) has listed 38 foodplants of the species for India.

A small detail in the habits of the borer, so far unpublished, is that the young larva sometimes starts boring in a leaf petiole, soon to move to a better suited place in the stem. This has been observed in *Swietenia mahagoni* and *Cassia siamea*. The larva may leave its gallery also in later stages, in search of better conditions.

Very little has been published on the diseases and enemies of the red branch borer. A fungus found on a larva, collected on an estate on Mt. Klut, East Java, has been identified by BOEDIJN as *Beauveria densa* or *basiana* (ANONYMOUS, 1933). A few parasitic wasps and a Tachinid have been observed with *Zeuzera* but only a somewhat conspicuous yellow Braconid, *Glyptomorpha* sp. (cf. MILLER, 1941), has been named. There was a picture of it on a colour plate by LEEFMANS (1916) but no name was given. Not infrequently the borer is pecked out by woodpeckers.

Zeuzera sp. Many times a borer infestation has been observed in saplings of *Cassia siamea*, of 5—12 cm in diameter and up to 6 m in height, growing in forest cultivations in various localities of Central and East Java. The infestation is conspicuous only in an advanced stage, when the trunks show annular swellings at various heights (Pl. 8, fig. 2). These swellings appear to have been caused by the overgrowing of horizontal tunnels encircling the trunks more or less completely. In recent infestations small holes are found along the trunks from which a black sap oozes and stains the bark. These holes correspond with horizontal galleries

immediately under the bark; they are a few mm high and 9—12 cm long and are excavated on one side or both sides of the hole. Often a red caterpillar of at most 2.5 cm is found which closely resembles a *Zeuzera* larva. The black stain covers a few square cm around the hole and can extend downwards over a few dm. All these borings appear to be stopped prematurely due to the death of the larva, this possibly being caused by the sap flow or a too rapid overgrowing of the entrance hole. As the larva of *Zeuzera coffeae virens* has the habit of forming a ring in the cambial zone and of further developing in the dying top part of a stem, the infestations described may be explained as to be abortive attacks of this species.

Z. roricyanea Walker, 1861. TOXOPEUS in his study of *Zeuzera* material in the collections at Bogor (1948) came to the conclusion that two species had been confounded when reference was made to a "red branch borer" in Java, regularly identified with *Zeuzera coffeae* Nietn. The apparently common polyphagous species found in small stems and branches he considered to be a subspecies (*virens* ssp.n.) of the South Asiatic *Z. coffeae* Nietner, 1861, originally found in Ceylon. The second apparently much rarer species TOXOPEUS identified as *Z. roricyanea* Walk., described from specimens collected in Sarawak, 1861, and also found in Kutei, S.E. Borneo. The biological note with regard to the latter species reads: "Reared from putat (*Barringtonia* sp.) and balsa (*Ochroma lagopus*) in Central and West Java." These particulars are based on material obtained during my forest entomological investigations. A few additional remarks should be made, now, taken from original field notes.

"Putat" is a collective name for Lecythidaceous trees, particularly *Barringtonia spicata* and *Planchonia valida*, not seldom growing wild in the teak woods in Central Java and reaching a height of 18 m and 50 m, respectively. The borer material seen by TOXOPEUS had been reared by Indonesian personnel from trunks of "putat" trees, 8—30 cm in diameter at breast height in the neighbourhood of the Gedangan field station. The moths emerged between the end of October and the beginning of March. The pupal stage lasted at least 20 days. An experiment to attract male moths from the surrounding forest to female specimens kept in outdoor gauze cages failed to give any evidence of such an attraction as has been so commonly observed in *Zeuzera coffeae virens* and in *Xyleutes* species (KALSHOVEN, 1934, 1940).

The following borer infestations also attributable to *Z. roricyanea* have been observed at Gedangan. (1) In young trees of *Melochia umbellata*, Euphorbiaceae, up to 12 cm in diameter; infestations near the base and higher up; sometimes a distinct swelling apparently caused by annular subcortical galleries; in other cases irregular ascending tunnels generally overgrown and marked by a prolific growth of callus tissue. (2) In a young tree of *Bauhinia malabarica,* Leguminosae, 25 cm in diameter; galleries in the woodlayers at three places of the trunk. (3) In a young *Eugenia polyantha,* Myrtaceae; an ascending tunnel of 35 cm; no horizontal annular section. These three cases refer to Gedangan, Central Java. (4) In a three year old plantation of *Casuarina equisetifolia*, Casuarinaceae, in Deli, East Coast of Sumatra; stems with ring-like galleries at various heights where the saplings were 4—8 cm thick; in some plots every tree was infested, often the tops died off a

few meters downwards or had broken off at a point coinciding with an annular gallery.

The infestation by *Z. roricyanea* of 1½ year old, vigorous *Ochroma lagopus* trees in the garden of the Forest Research Institute at Bogor in 1950—1951 has been described in some detail by VAN ALPHEN DE VEER & SUDIRO (1951), as due to "*Zeuzera coffeae*". The infestation occurred all over the trunks averaging 14 cm in diameter, and in the branches. Several trees showed swellings caused by the overgrowing of former galleries. Circular galleries right under the bark had caused the breaking off of top parts.

A similar attack had occurred in 1936—1937 in a newly started plantation of *Ochroma* in an estate in Bantam, West Java. The galleries had a horizontal section in the inner bark and cambial zone cutting through the outer wood layers while the rest of the tunnel was directed obliquely upwards but continued to run close under the bark, without killing the trees (Pl. 7 fig. 1).

VAN ALPHEN DE VEER and SUDIRO observed "the same borer" in the experimental garden at Bogor in young specimens of *Khaya anthotheca, Cedrela mexicana* and *Eucalyptus deglupta.* However, as they were unaware of the mixing up of two species of *Zeuzera* (red branch-borer) in Java it remains doubtful whether these three species of trees have to be listed as hosts of *roricyanea* or of *coffeae virens.* Both borer species may occur side by side in the same area in West and Central Java.

TOXOPEUS (l.c.) attributed an attack on cocoa trees (*Theobroma cacao*) recorded in 1900 to *roricyanea* and not to *coffeae.* If true, this fact must have escaped the attention of ROEPKE, though he made an extensive study of the borers of the cocoa trees in Central Java and had the collection of the Experiment Station at Salatiga at his disposal.*)

The above observations show that *roricyanea* is less common in the plains and lower hills of Java and is more selective in its choice of food plants than is *Z. coffeae virens.* For the rest TOXOPEUS' conclusion that "the distribution of this species (*roricyanea*) and the damage caused by it have been studied far from satisfactorily" is still valid.

Xyleutes strix strix L. is a large borer of *Sesbania grandiflora* (Leguminosae) ("turi" tree). Observations on its life history made at the Gedangan field station date from 1933.

The larvae bore tunnels into the wood of the base of trees of 4—20 cm in diameter. The tunnels extend downwards into the roots or upwards in the stem over a length of 10—25 cm. The base of the trunk becomes swollen and the bark is rough in consequence of the borer's activities. Young larvae are wine-red (resembling *Zeuzera* larvae), turning purplish later on and finally becoming yellowish or creamy. When full grown they are 7.5—8 cm. The larvae have been reared in the laboratory from the first instar to half grown specimens on "turi"

*) A minor error in TOXOPEUS' paper may be rectified here. He supposed that the "kola" plant mentioned by ROEPKE among the host plants of the red branch borer most probably was "coca". In fact the African Kola nut, *Cola nitida*, Sterculiaceae, was grown in those years on a small scale in the Experimental Garden at Salatiga.

twigs, frequently replaced, then moved to fresh *Manihot* roots, in which they bored readily and matured. Before pupation a close and strong cocoon is spun. The pupa rests in a gallery leading to the surface of the stem at about 10 cm above the ground. Before emergence the pupa forces its way outwards until it projects from the hole with the front half. After the moth has left, the empty skin remains sticking in the hole for a long time. The moths swarm in the months of November-January; they often appear in the afternoon. The females are rather sluggish, their abdomens being filled with countless eggs; they attract the males during the night; copulation may continue until 5 o'clock of the next afternoon. Shortly after pairing the female deposits the eggs in very large yellowish clusters (Pl. 9 fig. 1, 2). The development of first instar larvae and their dispersal is rather similar to what has become known of *Xyleutes ceramica* (cf. KALSHOVEN, 1934). The egg mass turns greyish on the 6th—8th day due to larvae leaving the egg shell and immediately starting to spin threads. Soon the cluster turns into a teeming mass of tiny larvae in a communal webbing. On the 12th—15th day the larvae leave the web and disperse over the plant or substrate constantly spinning. They move to projecting places like margins of leaves where they lower themselves on the fragile threads a short distance, dangling with the wind and lengthening the thread at each stronger puff of air. Where numerous suspended larvae are close together their parallel threads appear like a flimsy curtain. Ultimately the threads break and the larvae are carried with them and float in the air. When caught too soon by some neighbouring object they climb it and repeat the procedure of lowering themselves and being exposed to the wind until they finally break away and disappear into the air. Only a small fraction of the thousands of larvae will alight on or near a host plant and succeed in establishing themselves. This way of dispersal reminds one of that of air-borne seeds.

The total life cycle of the borer takes about a year.

Once the borer has been found in the root of a "kara" plant (probably *Dolichos lablab*, Leguminosae). The "turi" trees seem to sustain no distinct injury from a slight to moderate infestation. As the twigs and leaves are only used for fodder, the borer has hardly any economic significance.

X. persona Le Guill. 1841. ROEPKE (l.c.) has synonymized this species with *Duomitus leuconotus* auct. Under the latter name it is mentioned by several British authors as a borer in *Cassia* spp. in Ceylon, India and Burma (STEBBING, 1914, T. B. FLETCHER & GOSH, 1920, ANONYMOUS, 1923, MACKENZIE, 1923, GARTHWAITE, 1938, by this author as *Xyleutes persona*, and GARDNER, 1948). In the collection of the Instituut voor Plantenziekten at Bogor L. J. TOXOPEUS found a small male specimen with a host label *Cassia* sp. (handwritten note, dd. 21 June 1943; unfortunately no species name of *Cassia* is given). This seemingly confirms the association of the species with *Cassia* trees. However, DUPONT bred the moth from five almost full grown larvae and four pupae found in the base of a felled *Durio* tree at Bogor (1937). C. J. H. FRANSSEN (i.l.) observed several infested young trees of *Durio* ("durian") in the same locality, in January, 1957. These trees, mostly up to 10 cm in diameter, had large holes mainly in the basal parts but sometimes higher in the trunk, from which holes frass was expelled and sap

oozed. The largest holes measured 6 cm in length and 2.5 cm in width. Presumably the larva was a cambium and callus feeder. "Durian" trees in villages around Bogor appeared to harbour the borer rather frequently. Young trees may suffer to some extent, showing die-back of branches, but old trunks do not.

It is surprising that one and the same species of *Xyleutes*, which genus usually displays a certain selectivity, should live in trees botanically so different as *Cassia* (Leguminosae) and *Durio* (Bombacaceae). It is also curious that no Cossid borer has been found during extensive forest entomological investigations in Central Java, either in *Cassia fistula* or in *C. javanica*, trees not seldom grown in plantations and parcs. Therefore a further study of this discrepancy may be recommended.

HOULBERT (1916) assigned *leuconotus* Walk. to his genus *Melanostrigus*; he does not mention *persona* Le Guill. GARDNER (1948) writes: "it is doubtful whether *leuconota* is a synonym of *persona* LeG.".

X. ceramica ceramica Walk. 1865. BEEKMAN (1919) gave a detailed description of the holes of this borer in teak trees of diverse age in the forests in Java. In 1932 extensive investigations and experiments were started in the field station at Gedangan to further study the habits of the borer. Some success was achieved in breeding the moth ab ovo or from young larvae, in the laboratory as well as in living trees. The working out of the numerous data obtained is still unfinished, but a short communication on the main habits concerning copulation, oviposition and dispersal of first instar larvae was published by me in 1934 (in Dutch). British and Indian forest entomologists have contributed much to the knowledge and incidence of the borer in India and Burma. An extract of these data comprises some 8 pages in BEESON's handbook (1941).

DE MESA (1933) published a short note on the discovery of the borer in teak in the Philippines, where this tree has been introduced. He specifies that the larvae had been found in the branches of a large tree. In Java and India the borer lives in the trunk. The full grown larva is said by DE MESA to be "satiny white in colour", while in the countries just mentioned it is banded transversely with pink and white on each abdominal segment (BEEKMAN 1919, BEESON 1941).

ROEPKE (l.c.) records that the distribution area of the species includes New Guinea. In this connection it is interesting that a young plantation of teak in the Western part of the island appeared to be infested very soon after the experiment had been started. (Correspondence on this matter is in the 1956 files at the Tropical Institute, Amsterdam.)

From notes on host plants, so far available, it is clear that the borer is restricted in its occurrence to species of Verbenaceae all over the Far East, viz., *Gmelina arborea, Premna* sp., *Tectona grandis* and *Vitex pubescens.*

Woodpeckers as enemies of the borer have been known for a long time (BEEKMAN, 1919). In Bandjar, West Java, large squirrels (*?Ratupha bicolor*) were able to open the hiding tunnel of the borer in young teak trees, gnawing away the sap wood and causing large wounds (Pl. 9 fig. 3).

X. mineus mineus Cramer, 1775. The Indonesian name for the host plant of this borer in the teak area of Central Java mostly is "ri bandil" but, in a

few cases, has been mentioned as "setjang". Both names are used for thorny semi-climbers or shrubs. In the botanical literature the first name has been used for *Zizyphus oenoplia*, an uncommon plant of the Rhamnaceae (KOORDERS, Exkursionsflora, 1912). The second name indicates *Caesalpinia sappan*, Leguminosae, often grown in hedges. Presumably the latter identification of the host plant is the correct one.

The infestation occurs at the root collar of the stems which are 2—10 cm in diameter. Most galleries, up to 35 cm in length, run downards into the roots, some upwards. The larvae are yellowish with violet cross bands and dark spots on the abdomen.

The moths emerged from forest material in August-January. The behaviour of the species during the short adult stage and the dispersal of the young larvae were rather similar to those of the preceding species. The male moths became active at dusk (6.30 p.m.), vibrating their wings with a buzzing sound. A male specimen fixed by a cotton thread tried to fly away at this hour during four successive days. The females were more stationary and sometimes attracted a male from the surrounding forest during the night. Soon after copulation the females produced large egg clusters which turned reddish and began to hatch after about a fortnight. Experiments at the Gedangan field station in order to raise the borer from first instar larvae had little success (1932, 1933). During the first six months the larvae were given fresh twigs of the host. When they had reached a size of a few cm they were moved to *Manihot* roots. Development was slow and mortality very high. After a year from a hundred larvae only a small number of pupae had been obtained and several of these did not hatch. Ultimately only a few moths, most of them males, emerged, one year and two to seven months after the eggs had been laid.

X. maculata (Snellen, 1879). SNELLEN added to his description that, according to this collaborator PIEPERS, the larva presumably lives in Celebes in *Canarium commune* (Burseraceae). In Java the moth has been bred from a twig of cotton tree, *Ceiba pentandra* (ROEPKE l.c.).

Phragmataecia gummata Swinhoe, 1892 and *Ph. sumatrensis* Snellen, 1880. ROEPKE (l.c.) explains that a much longer morphological study is necessary for a satisfactory separation of the *Phragmataecia* species described from the Far East. As for the host plants he expresses his "strong conviction that the giant grass, *Saccharum spontaneum* ("kasur" or "glagah"), is the foodplant" and he quotes my notes on the occurrence of the borer in sugar-cane, *Saccharum officinarum* (KALSHOVEN, 1951). In fact a *Phragmataecia* had already been reported from *Saccharum spontaneum* in India in 1920 (FLETCHER & GOSH). For Java the sugar-cane borer has been listed and figured by ZEHNTNER in 1897 (p. 488; copied in VAN DEVENTER's Pests of Sugar-Cane, 1906). It was called the "Bandung borer" having been found in nursery fields for sugar-cane near Bandung, West Java, but not in the extensive sugar-cane plantations of Central and East Java. In 1925 the borer occurred in large numbers in an experimental plantation of sugar-cane in Deli, Sumatra's East Coast (VAN HALL, 1926).

In September, 1928, it was reported from the government selection gardens at Fort de Kock (± 1000 m, West Sumatra), the species being identified in this case as *Ph. parvipuncta* Hamps. at the British Museum, London (det. BRYANT). The borer was rather injurious to native sugar-cane fields at Padang Pandjang (W. Sumatra) in 1936 (KALSHOVEN, 1950 : 364). Under the name *Ph. castaneae* Hb. the borer has been reported repeatedly from sugar-cane in Malaya (*Rev. Appl. Entom.* 1924 : 36, 379 ; 1925 : 550). A *Phragmataecia* moth has been caught at lamplight at the Gedangan field station in the months February, April, September, and November. This is an indication that the larva finds a common breeding place in wild *Saccharum* on the borders and in the ravines of the teak woods.

T. B. FLETCHER & GOSH (Borers in sugarcane etc. in India, 1920) mentioned a "purple coloured Zeuzerid borer" in *Saccharum arundinaceum* (= *Erianthus arundinaceus*) and a "violet-spotted Zeuzerid borer (? *Phragmataecia* sp.)" in *Saccharum spontaneum* and *Andropogon sorghum.* They gave notes on the life history of the latter species and fine drawings of the larva, pupa and adult. Unfortunately ROEPKE has overlooked these data in the "Pusa Proceedings".

Cossid in *Ceriops.* A branch of *Ceriops* (Rhizophoraceae; a regular constituant of the coastal vegetation) tunneled by a borer, was collected on a small island of the tidal forest reservation Angké, North of Djakarta, in November, 1935. The larva proved to belong to the *Cossidae.* An attempt to breed the moth failed. Neither the specific host plant, nor the peculiar habitat give any clue to the possible identity of the borer.

SQUAMURIDAE (= Arbelidae, Indarbelidae)

This family is well represented in the Indomalayan region. ROEPKE (l.c.) stresses the fact that "a sharp discrimination between the species, at present, remains difficult".

Squamura maculata Heylaerts, 1890, is a very common species in the plains and lower hills of Java, attracting the attention by the cord-like webbings its larvae make on the bole and main branches of trees (Pl. 9 fig. 4). The larvae have the habit to loosen the rather narrow web in the beginning of the night and to shift it to an adjacent part of the bark on which they feed. They abrase only the epidermis and superficial tissues, going not deeper than 3—4 mm. Only the soft tissues are eaten, thick fibres and sklerenchym cells are left alone and become prominent. The marks and patterns are inconspicuous and do little or no harm to the tree. The activity of the larvae can be watched easily at night, using a lamp, as the web under which they work is transparant. At the slightest disturbance the larva immediately retreats in its hole. The moths do not become active until darkness. The males are attracted to the females; copulation has been observed between 9 and 10 p.m. Repeated experiments to rear the moth ab ovo in the Gedangan field laboratory proved successful only in a few isolated cases when fresh twigs of *Ceiba* were used as food. Total development required about a year.

ROEPKE mentions the cotton tree (*Ceiba*), two Leguminosae and four fruit trees as hosts. To these should be added *Erythrina*, *Cassia siamea*, and *Pithecolobium lobatum* as very common hosts but the list of occasional hosts could be extended

almost indefinitely. Apparently tree species with a smooth bark are most suitable. It is also interesting that more or less isolated trees are often selected, but not trees growing under the canopy of woods and groves. Perhaps the outer bark tissues are less nutritious in the latter case (lacking sufficient chlorophyl ?).

FRANSSEN (1941) mentions several additional fruit trees as hosts and reports on a very harmful occurrence of the borer in neglected *Citrus* gardens in the neighbourhood of Malang, East Java. A similar case was reported in 1914 (ANONYMOUS) in *Citrus* gardens at Punten, Mt. Ardjuno, East Java, in which instance many branches had died. This kind of damage, also described by FRANSSEN, much resembles that of *Sq. acutistriata* (see below); perhaps it was a mixed infestation in which more than one species of *Squamura* was involved. ROEPKE did not cite FRANSSEN but he recorded the breeding of an adult of *Sq. magma* de Joannis, 1921, from the bark and stem of *Citrus* (Bogor, June, 1953, TJOA TJIEN MO).

Sq. flavina Mell, 1923 is closely related to the preceding species and is numerous in the mountains of Java between 1000 and 1800 m (ROEPKE, 1957). Its habits appear to be similar to those of *maculata.*

Sq. celebensis Roepke, 1957. The single specimen on which ROEPKE founded his new species was reared from a branch of a cotton tree (*Ceiba pentandra*, Bombacaceae), Makassar, January, 1948, C. FRANSSEN. In December, 1939, a severe infestation of branches, particularly old branches, of old cotton trees was reported from South Celebes. The material submitted contained a reddish Cossid-like larva. No further material was investigated, but as the damage resembled that caused by a *Squamura* species (cf. *Sq. acutistriata*) it would not be too far-fetched to ascribe the injury to *Sq. celebensis*, the only known *Squamura* species recorded from Celebes in ROEPKE's monograph.

Sq. acutistriata (Mell, 1923). In contrast with *Sq. maculata* this species mainly lives in the crowns of trees, the branches of which are often short, bent and gnarled. Several observations were made on its occurrence in the crowns of "kedinding" trees (*Albizzia lebbeck,* Leguminosae) in the area near the field station at Gedangan. The larvae gnaw rather deeply, viz., 3—5 mm, into the bark of twigs and small branches, always under cover of a web, causing severe lesions and often the death of top parts. The dry wood of snags is also eaten. Repeated activity of the borer renders the tree tops gradually more suitable for breeding and the limbs become covered with scars.

Mature larvae are 30—32 mm; these larvae as well as pupae have been found in the beginning of September. The moths continued to appear until the first week of October, emerging mostly between 5 and 7 p.m. in the laboratory. Female moths, kept in a gauze cage outdoors, attracted the males from the environment several times. They appeared between 3 and 9 p.m., once even three specimens at the same time. When the door of the cage was opened they readily entered; copulation soon followed and was of short duration. Next day the eggs were laid in clusters stuck together by means of a slimy substance. When fresh they are isabella coloured, turning brown on the 5th day and hatching on the 10th day.

Rearing the moth in the laboratory succeeded only three times with young "kedinding" branches as food. The development required about one year.

DOCTERS VAN LEEUWEN (1910) described the injury of the species to cocoa trees (*Theobroma cacao*) in estates in Central Java.

Sq. tenera Roepke, 1957. The holotype, a male, was reared at Gedangan from a greyish larva, 20 mm, found in a horizontal annular gallery at 1 m above the soil, therefore rather low for a *Squamura,* on a teak sapling, 28 February, 1933. The method of feeding and webbing reminded of that of the rootcollar borer, *Endoclita sericeus*, but its behaviour and habitus were different. The larva had two large dorsal sclerotized plates on each segment with a slight dent between. It was placed for boring and feeding on fresh *Manihot* root, which was substituted by a new piece every 10—14 days; 29 August the larva pupated; during the night of 22/23 September the moth emerged.

DISCUSSION OF THE HABITS AND HOSTS OF INDOMALAYAN COSSIDAE AND SQUAMURIDAE

There occur *Xyleutes* species feeding on the nutritive cambial and callus tissue of a living trunk, while hiding and pupating in a short tunnel, which may be excavated in the heart-wood of old trunks and in the pith of saplings. *X. anceps* Snell. causes gall-like swellings in branches of *Derris* sp. (KALSHOVEN, 1950). Apparently several *Xyleutes* species live in the crowns of trees, but this group is still very insufficiently known. Some *Xyleutes* species are associated with certain plant families (Verbenaceae for *X. ceramica*) or genera (*Cassia* and *Durio* for *X. persona*) or even species (*Sesbania grandiflora* for *X. strix*).

Zeuzera larvae feed entirely on wood, having to digest large quantities and therefore to make long galleries. In *Z. indica* the galleries are excavated in the living wood of the trunk of Lauraceae. In *Z. coffeae* the larvae are only able to live in stems and twigs of small dimensions; after entering the stem the larvae bore a circular tunnel and thereby intersect the sapflow; they have their main development in the dying and dry top part of the stem (Pl. 8 fig. 1). The latter species appears to be most specialized in its boring technique, but not in the choice of its host plants. *Z. roricyanea* is intermediate between the two other species.

Phragmataecia species are exclusively associated with tall grasses like *Saccharum*, *Sorghum* and the like. As is shown in other Lepidopterous families, feeding on Graminaceae apparently requires special adaptation as it is met with only in a limited number of genera and species (cf. the *Phragmites* fauna in Europe). That a genus of the usually wood-boring *Cossidae* has become adapted to living in graminaceous stalks may be explained by supposing that the Cossid larvae possess the capacity to break down cellulose, an indigestible substance for most animals with the exception of several insect groups that live with particular symbionts.

In the *Squamuridae* the feeding on wood is much reduced. In boring their shelter tunnels the larvae often penetrate into old snags, wounds and rotten parts, or they simply inhabit a groove at the place of forking of the trunk and similar spots. A peculiarity of the larvae is that they construct extensive webbings, starting from the entrance hole of the tunnel and covering the portion of bark or wood on which

they feed. On the outside the web is covered with excrements and severed particles. In *Sq. acutistriata* the feeding on wood appears to be less reduced than in *Sq. maculata* and allied species. GARDNER (1948) has pointed to the resemblance in the habits of larvae of *Squamuridae* and *Hepialidae* which both feed in soft external tissues of the stem under a camouflage of frass and silk with a deeper tunnel for refuge. This resemblance is particularly striking in *Sq. tenera.*

3. TWO PYRALID BORERS OF BAMBOO

A peculiar kind of damage noticeable in bamboo groves in West Java consists of a series of diseased internodes at some height of the culms; these internodes are shortened and malformed and show several slits and clefts in the cylindrical wall (Pl. 10 fig. 6). KONINGSBERGER in his "Java zoologisch en biologisch" (1915) drew attention to this defect. He found a large number of flesh-coloured larvae, with a tough skin, and sometimes pupae, in the lowest part of the affected portion of the culm. These insects appeared to be well-known to the native population; they were called "tjangkilung" and were used for fishing bait. KONINGSBERGER could not explain on what tissues the larvae feed and how the moths escape from the sound internode in which they hatch. He recognized the moth as a Pyralid (although not attracted to lamplight), and emphasized the need for further investigation.

This further study was undertaken in 1940 by Dr. P. A. BLIJDORP and his Javanese assistant MAS SUDIRO, of the Instituut voor Plantenziekten at Bogor. KONINGSBERGER's conclusion about the kind of borer causing the malformation was soon confirmed. In Central Java a different Pyralid appeared to occur in bamboo culms. Owing to the Pacific War and the Japanese invasion, the work in the field and in the laboratory was left to Mr. SUDIRO and his native helpers. After the war, when I was working on a survey of the pests of Indonesian crops, I found a file containing field notes in Indonesian, tabulations and drawings, compiled during the foresaid investigations, carried out with much diligence during the years 1941—1944. Material of the moths was sent by me to the British Museum of Natural History in London. The identifications by the well-known lepidopterist, Mr. W. H. T. TAMS, were received in 1951, but publication of the notes has been delayed. Though a coherent record of the observations is not at hand, the data compiled by the Indonesian personnel point to various most interesting features in the biology of the borers. An extract covering the main points is presented here.

Chilo fuscidentalis Hampson, is the West Javanese species with brown markings, wing expanse 40—45 mm (Pl. 6 fig. 1—2). This is essentially a borer of sprouting bamboo. Sprouts of new culms begin to appear in bamboo groves in West Java in October. They grow fast in height, reaching a length of 25—100 cm in a month. By this time their top is crowned by a thick bunch of bracteae, which is shed afterwards. At the end of the month of December the sprouts may be 150—250 cm high. The *Chilo* moths swarm in the period November—January and lay characteristic flat batches of eggs, free from hairs or scales, on the sprouts, about half way to the top (Pl. 6 fig. 7—9, Pl. 10 fig. 1). They contain 40—140 eggs (90

on an average) which are arranged imbricately. When hatching after 12—13 days the slender larvae, 2.5—2.75 mm in size, begin to move upwards in a file. They are in search of a spot suited for boring into the tissue. Three to five of the foremost individuals select the spot and begin the boring which may be at a distance of 100—200 cm above the batch of egg shells. The group acts gregariously, the larvae of the "shock troop" are replaced by new individuals which take their turn in deepening the entrance, the other larvae milling and resting around (Pl. 10 fig. 2, 3). Soon the roundish hole, 1.75—2.75 mm in diameter, is deep enough and the larvae disappear into it. Extrusion of a milky fluid from the hole indicates that inner tissues are reached. The whole process takes less than 24 hours. Often, after 2—5 weeks, a curious T-shaped hole leading outwards, appears in a sound joint beneath the cap, but more results of the activities of the larvae come into evidence after the cap of dry bracteae is shed. It then appears that a series of 8—10 newly formed joints below the top of the sprout which were in process of lengthening and hardening, are stunted and show window-like slits. Moreover, in some cases it appears that a round hole of 9 mm in diameter and closed with silk has been made in one of the sound joints beneath the affected part. The T-hole is widened by the larvae occasionally, but keeps the same shape (Pl. 10 fig. 5). From this hole, sometimes, substantial quantities of dirty coloured liquid are discharged. As a rule the top of the sprout keeps growing and forming normal joints, but it has been observed in several cases that the part formed after the borer-invasion looks thinner than normal; seldom the top withers. All this takes place between the months January-September. In two cases where the infested parts of the culm had to be opened early, the larvae had grown to 24—26 mm in length and 4—6 mm in width in a period of 9—12 weeks.

When undisturbed, the larvae, then 30—31 mm in size and apparently fully developed, begin to assemble in September, in a sound joint of the culm, just above the joint with the T-opening, that is, 2—5 joints below the damaged section (Pl. 10 fig. 4). The larvae reach these joints via roundish holes which have been bored through several sound partitions; these holes are closed by silk afterwards. The mature larvae keep moving for some time and appear to abrase from the inner wall of the joint the powdery substance which is present in normal joints. Ultimately they settle on the ceiling of the internode selected where they attach themselves with the cremaster and pupate in a hanging position (Pl. 6 fig. 10). This, again, is a gregarious action.

Some 7 weeks after pupation the moths appear, their emergence being spread over a period of some 3 weeks. Where the round exit hole has been formed it appears that the moths use this for emergence, otherwise they apparently use the T-shaped hole. They squeeze through the opening when still wet and crawl a little distance upwards to unfold the wings and dry. Hatching of the moths takes place during the first half of the night, beginning at about 8 o'clock p.m. An infested culm may yield up to 70 or 80 moths. The longevity of the moths is 12—18 days.

Several attempts failed to have the moths copulate and oviposit in gauze cages provided with cut bamboo sprouts or live sprouts in the field. Therefore egg batches were collected from sprouts in bamboo groves in the neighbourhood of Bogor and

transmitted to sprouts in private yards where they could be kept under control and for regular inspection. Notwithstanding these precautions the number of cases where the whole process had its normal course was limited (in some 10 out of 30 experiments, taken at the time the habits of the borer had become roughly known).

There are several factors which endanger a successful development of the borer. (1) The eggs become covered with a fungus; (2) they turn black, being parasitized by a tiny wasp with red eyes, most probably a *Trichogramma* sp.; (3) they are destroyed by ants; (4) the infested part of a sprout is gnawn by a squirrel (to feed on the milky fluid rather than on the boring larvae, as a part of the larvae still can continue their development); (5) the top of the infested sprout withers which prevents the borers to develop; (6) a part of the pupae die; (7) a part of the emerged moths are crippled. It seems possible that factors 1, 3 and 7 are the result of unnatural conditions prevailing during the experiments.

According to the observations of Mr. SUDIRO attack by "tjangkilung" particularly occurs in dense bamboo groves in moist places. The semi-wild groves are attended to by the owners who thin out the sprouts to reduce a too abundant tillering and to use the sprouts as a vegetable.

The main hosts of the borer are *Gigantochloa apus* ("bambu tali"), the species most commonly grown in West Java, and *G. verticillata* ("bambu andong"). The internodes hollowed out and disfigured by the borer number 9—14 in a single culm; the total length of the affected part is 90—220 cm. Counts in the villages around Bogor have shown that some 9% of the bamboo culms were spoilt by this borer in the years 1941—1943. In the early months of 1944 strikingly less egg batches could be found in comparison to the three preceding years.

Eschata chrysargyria Walk., the borer from East Java is a lustrous white species, 36—40 mm. According to the very incomplete notes available, the habits of this species are quite different from those of the preceding borer. Young bamboo culms infested by *Eschata* have 1—4 internodes which outwardly show one or two small holes in the wall and a few black punctures, besides a dark ring at the top. From the holes sap may be oozing. The black rings are caused by a flat circular gallery bored in the inner wall of the cylinder just beneath a partition and interrupting the sapflow. A single larva or a pupa may be found inside an internode marked in this way. The pupa is enclosed between two spun membranes in the internode and is suspended head downwards from the upper membrane. This separate room also has a hole in the wall close to the head part of the pupa and apparently made by the larva before pupating. It is closed by silk and is used by the moth for emergence. The internodes occupied by the borer are not malformed and it seems that the larva mainly feeds on nutritious slimy matter ("legon") which accumulates in the internode.

The borer has been found in wild growing groves of *Bambusa vulgaris* ("bambu legi") and *Gigantochloa verticillata* ("bambu wulung") in the teak area of Central Java.

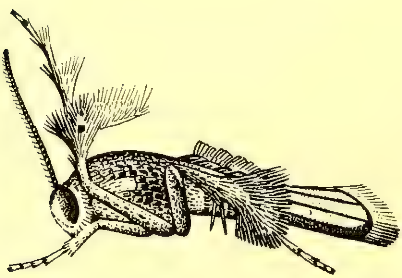
4. NOTE ON THE BIOLOGY OF *AMPHITALES EPISCOPOPA* MEYR. (AEGERIIDAE)

In April, 1937, the forest superintendent F. J. APPELMAN discovered an unknown disease of *Actinophora fragrans* (Tiliaceae, "walikukun") in an 8-year old plantation between Bondowoso and Situbondo, East Java, at 150 m altitude. The timber species had been used as an admixture in a plantation of teak (*Tectona grandis*). The *Actinophora* trees showed patches of very rough bark with fissures and excrescenses along their stems, which had a diameter of 4—12 cm (Pl. 8 fig. 5). The type of damage reminded the reporter of bark cancer ("Krebs"), some trees having the diseased parts all over the stem. In some parts of the plantation 75% and more of the trees had been affected.

An investigation of material submitted to the Instituut voor Plantenziekten at Bogor taught me that the injury apparently originated primarily from galleries of a small reddish caterpillar, made in the living bark of the trunks, particularly at the base of side branches and snags. This had led to the formation of fissures in the bark and to callus growth, while secundary fungi had killed part of the tissues. Additional galleries had been made along the margin of the wounds and had enlarged the sickly portions.

Some 19 specimens of a small peculiarly looking moth (text fig. 2) were bred between 25 May and 5 July, 1937, from infested stems sent to Bogor. Specimens of the species sent to the British Museum of Natural History were identified as *Amphitales episcopopa* Meyr. (det. STRINGER, 1939).

Similar damage to young *Actinophora* trees was found in Central Java later, but no further investigations have been carried out.



Text fig. 2. *Amphitales episcopopa* Meyr. (× 10; by Indonesian artist)

BIBLIOGRAPHY

ALPHEN DE VEER, E. J. VAN and M. SUDIRO, 1951. Observations on the attack of Zeuzera coffeae Nietn. on Balsa. *Tectona* 41 : 137—139.

ANONYMOUS, 1914. Jaarboek Departement van Landbouw, Nijverheid en Handel: 82. Batavia.

———, 1923. A preliminary list of the pests of cultivated plants in Ceylon. *Dep. Agric. Ceylon B.* 67 : 18.

———, 1933. Verslag Algemeen Landbouw-Syndicaat : 163. Soerabaja.

BEEKMAN, H., 1919. De groote Djati-boorder (oleng-oleng), Duomitus ceramicus Wlk. *Meded. Proefst. Boschwezen* 4 : 1—17.

BEESON, C. F. C., 1941. The Ecology and Control of the Forest Insects of India and the Neighbouring Countries. Dehra Dun.

BHASIN, G. D., M. L. ROONWAL and BALWANT SINGH, 1958. A list of insect pests of forest plants in India and the adjacent countries, Part. 3. *Ind. Forest Bull.* 171.

DOCTERS VAN LEEUWEN, W. M., 1910. Arbela dea Swinhoe, een met de Zeuzera coffeae Nietn. verwante cacaoboorder. *Meded. Alg. Proefst. op Java te Salatiga* [2] 37.

DUPONT, F., 1937. Three moths new to the fauna of Java. *Ent. Meded. Ned. Indië* 3 : 10—12.

FLETCHER, BRAINBRIGGE T. and C. C. GOSH, 1920. Borers in Sugar-cane, Rice, etc. *Report Proc. Third Entom. Meeting Pusa* : 345.

FRANSSEN, C. J. H., 1941. De Plagen van de Djeroekcultuur in Nederlandsch-Indië. *Meded. Inst. v. Plantenziekten* 86.

GARDNER, J. C. M., 1948. Immature stages of Indian Lepidoptera (Cossidae, Indarbelidae). *J. Bomb. Nat. Hist. Soc.* 45 : 390—396.

GARTHWAITE, P. F., 1938. Entomological Research. Rep. Silv. Entom. Burma 1936—1937 : 93—103. Rangoon.

HALL, C. J. J. VAN, 1926. Ziekten en Plagen der Cultuurgewassen in Nederlandsch Indië. *Meded. Inst. v. Plantenziekten* 70.

HEYNE, H., 1950. De Nuttige Planten van Indonesië. 's Gravenhage/Bandung.

HOULBERT, C. 1916. Catalogue systématique de la Tribe des Xyleutinae. In: Ch. Oberthür, C. Houlbert et F. P. Dodd, *Etudes Lép. Comp.*, fasc. 11bis : 107.

KALSHOVEN, L. G. E., 1919. De roode takboorder, Zeuzera coffeae Nietner in boschculturen. De roode stamboorder, Zeuzera postexcisa Hamps. *Meded. Proefst. Boschwezen* 4 : 57—65, 69—71.

———, 1934. Levenswijze van de in djatiboomen levende Cosside : Duomitus ceramicus (Communication). *Verslagen Afd. Nederl. Oost-Indië, Ned. Ent. Ver.* 1 (5): 148—149.

———, 1940. Observations on the red Branchborer, Zeuzera coffeae Nietn. *Entom. Meded. Ned. Indië* 6 : 50—54.

———, 1951. De Plagen van de Cultuurgewassen in Indonesië. 1 : 359—364.

KONINGSBERGER, J. C., 1915. Java zoölogisch en biologisch.

LEEFMANS, S., 1916. Bijdrage tot het Helopeltis vraagstuk voor de Thee. *Meded. Labor. Plantenziekten* 26 : 95, Pl. 1, fig. 6.

MACKENZIE, J. M. D., 1923. Report on work done between 17th Oct., 1921 and 31st. March, 1922 on the beehole-borer investigation. *Burma For. Bull.* 7, Rangoon.

MESA, A. DE, 1933. A giant teak moth borer Duomitus ceramicus Walk. *The Makiling Echo* 12 : 100—101.

MILLER, N. C. E., 1932. Preliminary list of foodplants in the Federated Malay States.

———, 1941. Insects associated with Cocoa (Theobroma cacao) in Malaya. *Bull. Ent. Res.* 32 : 1—16.

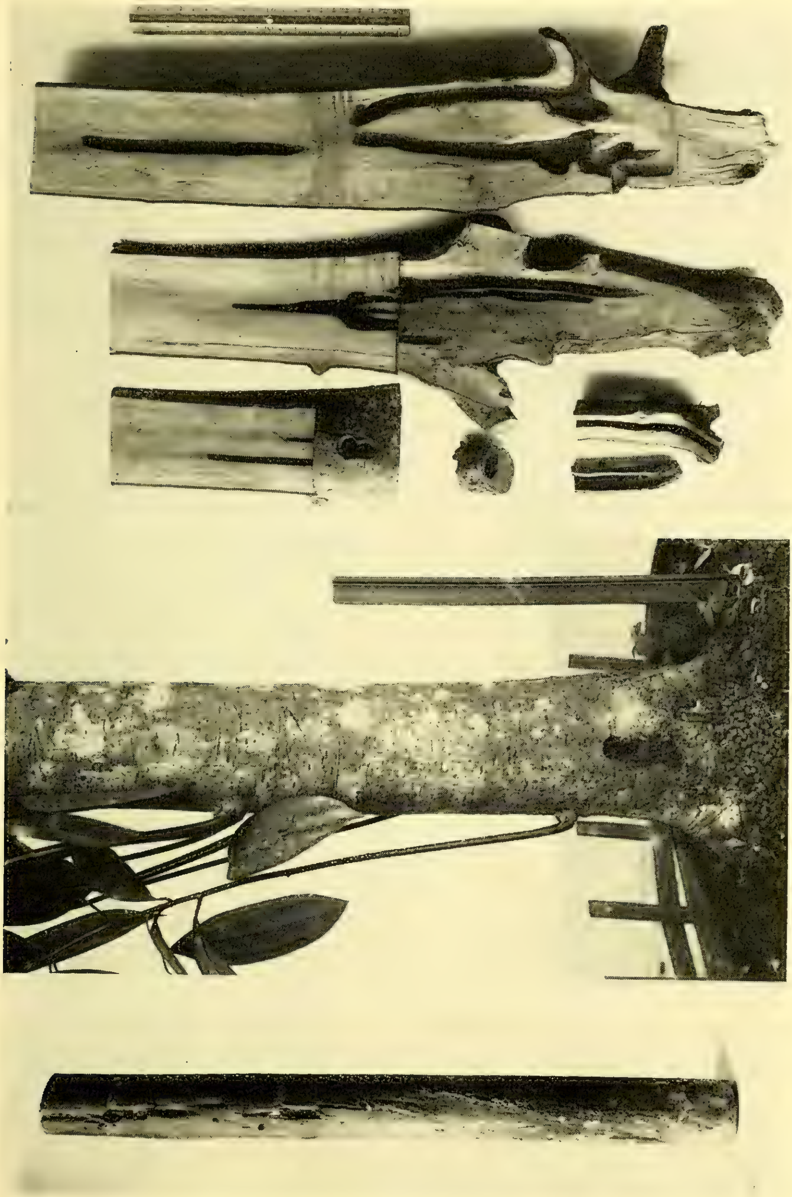
PHILLIPS, W. W. A., 1938. The mating of the moth Phassus purpurascens Moore. *Spolia Zeylanica* 21 : 63.

RIDLEY, 1896. *Agric. Bull. Mal. Peninsula* 5 : 116.

ROEPKE, W., 1957. The Cossids of the Malay Region. *Verh. Kon. Ned. Akad. Wet., Nat.* 52 : 1—60.

STEBBING, E. P., 1914. Indian Forest Insects of economic importance. Coleoptera.

TOXOPEUS, L. J., 1948. On the borer moths Zeuzera coffeae Nietn. and Z. roricyanea Wlk. (neuropunctata Gaede). *Treubia* 19 : 167—175.



1 2 3

Fig. 1. Balsa trunk (*Ochroma*) with lesions caused by *Zeuzera roricyanea* (× 1/12). Fig. 2. Basal part of young *Cinnamomum* tree with hole and faecal pellets of *Zeuzera indica* (× 1/6). Fig. 3. The same with galleries in the wood exposed

L. G. E. KALSHOVEN : *Injurious Lepidoptera from Java*

1 2 4

Fig. 1. Characteristic injury of teak sapling by *Zeuzera coffeae*; top leaves wilted, upper stem tunneled over 1.6 meter, new suckers growing from the base. Fig. 2. Trunk of *Cassia siamea* with two annular swellings. Fig. 3. Subcortical gallery exposed, with larva of *Zeuzera* sp. in situ, and large blackish stain on the bark. Fig. 4. Manihot plants damaged by *Endoclita sericeus*. Fig. 5. Stems of *Actinophora fragrans* damaged by *Amphitades episcopopa*.

1

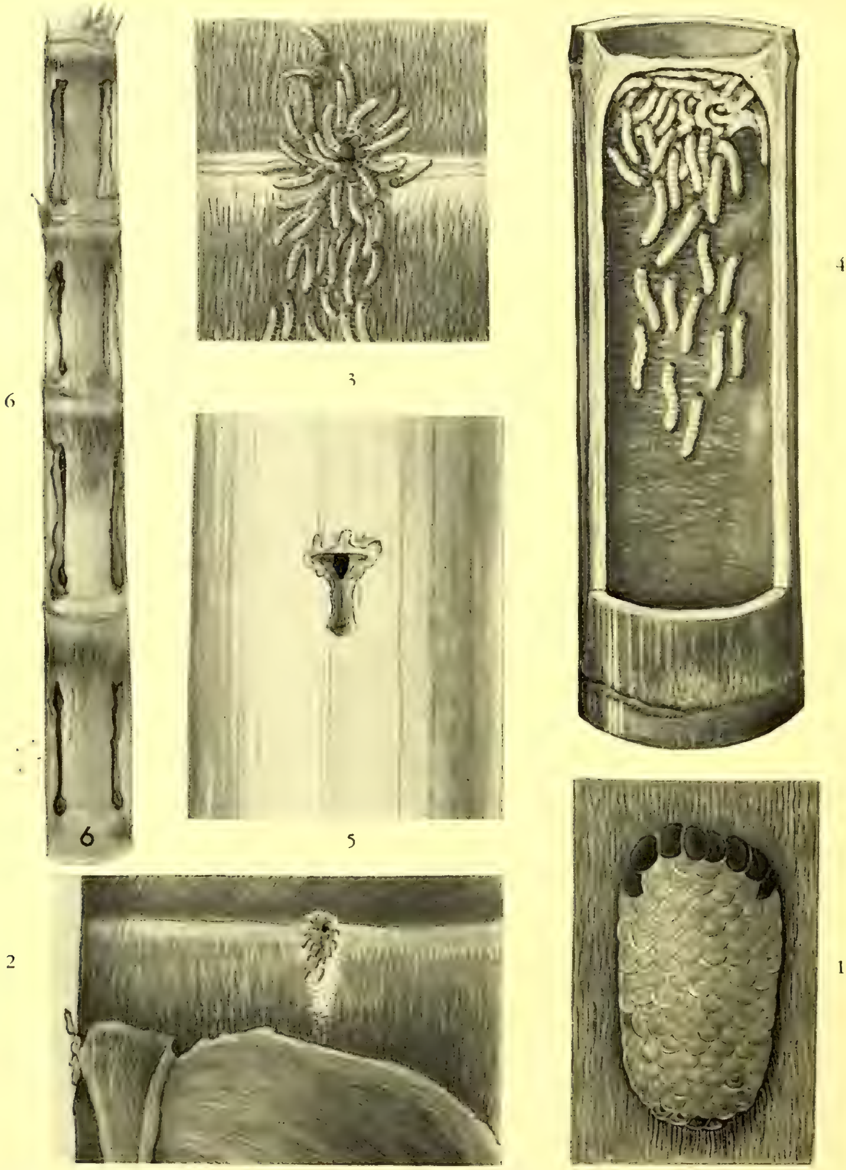
4

2

3

Fig. 1. Camouflaged moth of *Xyleutes strix* on lichen-covered trunk ($\times$ 2/3). Fig. 2. Egg mass of the same ($\times$ ½). Fig. 3. Wounds on teak stems left by squirrels in search of the larva of *Xyleutes ceramica*; left, fresh; right, overgrowing. Fig. 4. Cord-like web of *Squamura maculata* larva on the trunk of *Ceiba*; traces of feeding alongside the webbing ($\times$ 2/3)

L. G. E. KALSHOVEN: *Injurious Lepidoptera from Java*



Chilo fuscidentalis. Fig. 1. Batch of eggs on a bamboo sprout, the upper row parasitized (much enlarged). Fig. 2. First instar larvae entering the newly formed communal hole. Fig. 3. The same (× 4). Fig. 4. Full grown larvae assembling in a sound joint, in preparation of pupation. Fig. 5. T-shaped hole made by the larvae from the inside. Fig. 6. Section of bamboo culm showing the traces of former borer activities at the time the joints were still weak. (After drawings by Indonesian artists)

L. G. E. KALSHOVEN : *Injurious Lepidoptera from Java*

Tijdschrift voor Entomologie

Het verschijnt in één deel van 350—450 bladzijden per jaar, bestaande uit enkele afleveringen.

Entomologische Berichten

Deze zijn bestemd voor de publicatie van kortere artikelen, faunistische notities etc., alsmede van de Verslagen der Vergaderingen en van mededelingen van het Bestuur. Zij verschijnen twaalf maal per jaar in een aflevering van 16 of meer bladzijden, die samen een deel vormen.

Trichopterorum Catalogus

Deze Catalogus van F. C. J. Fischer wordt door de Vereeniging voor rekening van de auteur uitgegeven. Alle bekende recente en fossiele soorten van de gehele wereld met hun synoniemen worden er in behandeld. Delen I en II kosten f 39.— per stuk, delen III—V: f 45.—. Er zullen in totaal 15 delen verschijnen. Van alle delen zijn ook éénzijdig bedrukte exemplaren beschikbaar. De prijsverhoging hiervoor bedraagt f 2.50.

Entomologia Experimentalis et Applicata

Dit tijdschrift wordt uitgegeven door de Noord-Hollandse Uitgevers Maatschappij te Amsterdam in opdracht van de Vereeniging. Het publiceert artikelen over experimentele biologie en oekologie bij insecten en andere land-arthropoden. Het verschijnt vier maal per jaar en bevat 320 bladzijden. De prijs voor leden bedraagt f 25.—, voor niet-leden f 40.— per jaar.

Alle zakelijke correspondentie betreffende de Vereeniging te richten aan de Secretaris, W. Hellinga, Weesperzijde 23II, Amsterdam-O.

Alle correspondentie over de redactie van het Tijdschrift voor Entomologie en de Monographieën te richten aan de Redacteur, Dr. A. Diakonoff, Rijksmuseum van Natuurlijke Historie, Leiden.

Alle correspondentie over de redactie van de Entomologische Berichten te richten aan de Redacteur, B. J. Lempke, Oude IJselstraat 12III, Amsterdam-Z. 2.

Alle correspondentie over de redactie van Entomologia Experimentalis et Applicata te richten aan de Redacteur, Dr. P. A. van der Laan, Lab. voor Toegepaste Entomologie, Linnaeusstraat 2 B, Amsterdam.

Alle betalingen te richten aan de Penningmeester, Drs. H. Wiering, Doorntjes 29, Bergen (N.H.), postgiro 188130, ten name van de Nederlandsche Entomologische Vereeniging te Bergen (N.H.).

Alle correspondentie betreffende de Bibliotheek der Vereeniging te richten aan de Bibliotheek, Zeeburgerdijk 21, Amsterdam-O.

Notice to Subscribers

All correspondence referring to subscriptions and exchange of the periodicals of the Netherlands Entomological Society should be addressed to the Librarian, Zeeburgerdijk 21, Amsterdam-O, Netherlands.

NOTICE TO CONTRIBUTORS

Contributors will receive free of charge fifty reprints of their papers, joint authors have to divide this number between them at their discretion. Additional reprints may be ordered when returning proofs.

Manuscripts should be written in Dutch, English, French, German or Italian. If they contain descriptions of new genera, species, etc., they should be in one of the four last mentioned languages.

The author should communicate with the editor before submitting his manuscript. He will enclose with manuscript a Synopsis (Abstract), styled according to recommendations of the UNESCO (style rules will be provided by the editor) and, if needed, a Summary. Papers in Dutch should contain an Abstract and/or a Summary in one of the four other languages.

Manuscripts should be typewritten in double spacing on only one side of the paper, with a margin of at least three cm at the left side of each sheet. Paragraphs should be indented. Carbon copies cannot be accepted, as handling makes them illegible.

Captions for text figures and plates should be written on a separate sheet in double spacing, numbered consecutively in arabic numerals; the use of a, b, c, or any other subdivision of the figure numbering should be avoided.

Drawings for reproduction should be on good paper in Indian ink, preferably at least one and a half times as large as the ultimate size desired. Lettering should be uniform, and, after reduction, of the same size. Photographs should be furnished as shiny positive prints, unmounted. Plates should be arranged so as to fill a whole page (11.5 x 19 cm) of the *Tijdschrift,* or a portion thereof, captions included. Combinations of illustrations into groups are preferable to separate illustrations, since there is a minimum charge per block.

Names of genera and lower systematic categories, new terms and the like are to be underlined by the author in the manuscript by a single straight line. Any other directions as to size or style of the type are given by the editors, not by the author. Italic type or spacing to stress ordinary words or sentences is to be avoided. Dates should be spelled as follows: either "10.V.1948" or "10 May, 1948". Other use of latin numerals should be avoided, as well as abbreviations in the text, save those generally accepted. Numbers from one to ten occurring in the text should be written in full, one, two, three, etc. Titles must be kept short. Footnotes should be kept at a minimum.

Bibliography should not be given in footnotes but compiled in a list at end of the paper, styled as follows:

Mosley, M. E., 1932, "A revision of the European species of the genus *Leuctra* (Plecoptera)". — Ann. Mag. Nat. Hist. [10] 10 (3): 1—41, pl. 1—5, fig. 1—57. Number of issue should only be added (in parentheses) when it has individual pagination.

Text references to this list might be made thus:

"Mosley (1932) says...." or "(Mosley, 1932)".

The editors reserve the right to adjust style to certain standards of uniformity.

Manuscripts and all communications concerning editorial matters only should be sent to: Dr. A. Diakonoff, Rijksmuseum van Natuurlijke Historie, Leiden, The Netherlands.

DEEL 108 AFLEVERING 5 1965

TIJDSCHRIFT VOOR ENTOMOLOGIE

UITGEGEVEN DOOR

DE NEDERLANDSCHE ENTOMOLOGISCHE VEREENIGING

INHOUD:

Tijdschrift voor Entomologie, deel 108, afl. 5. Gepubliceerd 30-VII-1965

Nederlandsche Entomologische Vereeniging

De contributie voor het lidmaatschap bedraagt f 15.—, voor student-leden f 2.50, per jaar. — Begunstigers betalen jaarlijks tenminstet f 15.—.

De leden, behalve de student-leden, ontvangen gratis de *Entomologische Berichten,* waarvan de prijs voor student-leden f 1.50 per jaar, voor niet-leden f 20.— per jaar en f 2.— per nummer bedraagt.

De leden kunnen zich voor f 10.— per jaar abonneren op het *Tijdschrift voor Entomologie*; hiervan bedraagt de prijs voor niet-leden f 35.— per jaar.

De eerder verschenen publicaties der Vereeniging zijn voor de leden tegen verminderde prijzen verkrijgbaar. De Vereeniging geeft de volgende publicaties uit.

Monographieën van de Nederlandsche Entomologische Vereeniging

Deze worden met onregelmatige tussenpozen uitgegeven. Er zijn reeds verschenen:

— F. T. Valck Lucassen et al. — Monographie du genre Lomaptera Gory & Percheron (Coleoptera, Cetoniidae), prijs f 50.—.

1. A. J. Besseling. — De Nederlandse Watermijten (Hydrachnellae Latreille, 1802), prijs f 25.—.

A REVISION OF THE BURMESE PARADOXOSOMATIDAE (DIPLOPODA, POLYDESMIDA) IN THE MUSEO CIVICO DI STORIA NATURALE AT GENOA (PART I) [1]

BY

C. A. W. JEEKEL
Zoölogisch Museum, Amsterdam

Abstract

This paper treats part of the Paradoxosomatidae from Burma described by POCOCK, 1895, many of which were considered species incertae sedis up to now. All species examined are redescribed and illustrated. The genus *Agnesia* Attems, 1953, is redefined and its relationship discussed. The species of the genus *Anoplodesmus* Pocock, 1895, are briefly surveyed and their interrelationships discussed. The discontinuous area of the genus is shown in a map. The genus *Trogodesmus* Pocock, 1895, is redefined; *Attemsina* Hoffman, 1963, is considered to be a junior synonym. The Oriental Paradoxosomatidae characterized by the presence of a femoral tubercle in the first pair of legs of the male are reviewed and their relationships discussed. The genus *Tetracentrosternus* Pocock, 1895, which belongs to this group, is redefined, and a new genus, *Pocockina*, for *Orthomorpha pilifera* Pocock, 1895, also belonging to this group, is established.

Our knowledge of the millipede fauna of Burma largely goes back to the work of POCOCK. This author published in a series of papers (1890, 1893, 1895, 1896), the results of his studies based on the precious material of the expedition by the famous Italian collector LEONARDO FEA to that country.

POCOCK's descriptions of the many new species in this collection were, as regards the verbal part, sufficiently adequate for those days. However, failing a clear apprehension of the systematic importance of the male gonopods, his drawings of these organs are practically useless. In consequence, the taxonomic status of most of the species remained dubious, and the diplopod fauna of Burma in effect is still largely an enigma.

The Paradoxosomatidae of the FEA collection filled most of the 1895 paper. Out of 34 recorded species, 32 were described as new, and of the 7 genera dealt with, 5 were new.

With this, the importance of a re-examination of these paradoxosomatids is sufficiently explained.

In the spring of 1964 I had the opportunity to study the Paradoxosomatidae in the collection of the Genoa Museum, where most of the diplopod types of the FEA collection were supposed to be.

Of course, not the entire material upon which POCOCK based his report could be

[1]) Based on data accumulated through the aid of a grant (I 954-36) from the Netherlands Organisation for the Advancement of Pure Research (Z.W.O.) and the Italian National Council of Research (C.N.R.).

located. The author certainly had his share of the available duplicates, and these are probably in the British Museum (Natural History) now. Moreover, some specimens appear to have been traded to the Hamburg Museum (WEIDNER, 1960). Finally, it was found in Genoa that material of some species, amongst it unfortunately some very important types, was borrowed by SILVESTRI in 1902 and was never returned. This material presumably is still in the SILVESTRI collection in the Laboratorio di Entomologia Agraria at Portici (JEEKEL, 1965).

Nevertheless, the great majority of the species described by POCOCK could be re-examined, as is shown in the list below.

LIST OF BURMESE PARADOXOSOMATIDAE DESCRIBED OR RECORDED BY POCOCK, 1895

Names printed in Clarendon type refer to species of which there is no material in the Genoa Museum, but which are most probably in the British Museum (Natural History) of London. Names between brackets refer to species of which the material should be in Genoa, but which are now probably in Portici. The species marked with an asterisk have been re-examined, the results being published in the present paper. The other species will be treated in a subsequent paper.

(*Eudasypeltis pusillus* Pocock)
**Anoplodesmus anthracinus* Pocock
* —— *striolatus* Pocock
* —— *pinguis* Pocock
* —— *obesus* Pocock
(*Strongylosoma ocellatum* Pocock)
**Tetracentrosternus subspinosus* Pocock
(*Trogodesmus bicolor* Pocock)
* —— *vittatus* Pocock
* —— *nigrescens* Pocock
**Orthomorpha bisulcata* Pocock
—— *coarctata* Saussure, 1860
* —— *pilifera* Pocock
* —— *coxisternis* Pocock
—— *miranda* Pocock
—— *melanopleuris* Pocock
—— *bistriata* Pocock
—— *bivittata* Pocock
(*Orthomorpha minlana* Pocock)
—— *karschi* (Pocock, 1889)
—— *insularis* Pocock
—— *clivicola* Pocock
—— *palonensis* Pocock
—— *monticola* Pocock
—— *gestri* Pocock
—— *oatesii* Pocock
—— *fuscocollaris* Pocock
* —— *doriae* Pocock
* —— *silvestris* Pocock
Prionopeltis planatus Pocock
(—— *taurinus* Pocock)
—— *cervinus* Pocock (a redescription of this species was published recently (JEEKEL, 1964)

I take pleasure in acknowledging my sincere gratitude to Professor Dr. E. TORTONESE and Miss Dr. DELFA GUIGLIA, Director and First Curator, respectively, of the Genoa Museum, for providing ample facilities for my work in the collections of that Museum.

Agnesia Attems

1937 *Anoplodesmus* in part; Attems, Tierreich 68 : 98.
1953 *Agnesia* Attems, Mém. Mus. nat. Hist. nat. (n.s.) [A] 5 : 174.
1953 *Anoplodesmus* in part; Attems, l.c.: 163.

Type-species.

Agnesia nodulipes Attems, 1953, by original designation.

Diagnosis.

20 somites; poreformula normal. Head without particulars. Antennae of moderate length, somewhat clavate. Collum distinctly wider than the head.

Somites rather weakly to moderately constricted. Stricture of moderate width to rather broad. Metatergites with a rather deeply impressed transverse furrow from the 4th or 5th somite onwards. Pleural keels only in the anterior half of the body or up to the 16th or 17th somite.

Lateral keels well developed, those of the 2nd somite below the level of those of the 3rd. Posterior edges of the keels produced caudad in all somites. Lateral margins at least with traces of an indentation.

Sternites of the somites of the middle of the body about as long as wide in the male, broader than long in the female. Sternal cones weakly developed or absent. Sternite of the 5th somite of the male between the anterior legs with a short, broad process, which is more or less incised in the middle. Sternite of the 6th somite somewhat modified in the male. Legs rather long. Tibial and tarsal brushes present up to the middle of the body, or absent. First leg of the male without modifications. Generally a number of podomeres in the middle part of the body of the male are provided with one or more ventral tubercles.

Gonopod coxa moderately developed. Gonopod prefemur well developed, somewhat elongate, laterally well demarcated from the femur. Femur well developed, widening considerably in the distal direction. Spermal channel running along the medio-anterior side towards the base of the solenomerite. Postfemoral region distinctly demarcated laterally. Solenomerite arising from the medio-anterior side of the distal end of the femur; at the anterior side of the base of the solenomerite the femur protrudes slightly or is produced into a spine-like process. Postfemur with one or two processes of variable size; the lateral margin of the postfemur is cristate and projects distad of the base of the tibiotarsus. Tibiotarsus a simple solenophore without secondary processes; lamina medialis and lamina lateralis both well developed, sheathing the flagelliform solenomerite for its greater part, curving caudad first, then laterad and finally cephalad.

Remarks.

In a tentative arrangement of the species hitherto referred to *Orthomorpha* and *Pratinus* (JEEKEL, 1963) I argued the necessity of excluding *Orthomorpha doriae* Pocock from the genus *Orthomorpha*. The re-examination of the type material of this species and of the even more enigmatic *Orthomorpha silvestris* Pocock now shows that these two species have nothing to do with *Orthomorpha* in the present-day concept of that genus, and that they are referable to the genus *Agnesia* Attems.

Agnesia was established by ATTEMS in 1953 to include a single species: *A. nodulipes* Attems, 1953, from Indochina. With this evidence at hand, however, it seems better to widen somewhat the concept of this genus.

Actually, it is strange that ATTEMS himself did not notice the obvious relationship between *Agnesia nodulipes* and two Indochinese species he erroneously associated with *Anoplodesmus*, namely *Anoplodesmus hilaris* Attems and *Anoplodesmus mutilatus* Attems, the latter of which he described in the very same paper.

A critical examination of the descriptions of *nodulipes*, *hilaris*, and *mutilatus* gives only one important character for separating *nodulipes* from the other two species, i.e., the spiniform process at the end of the gonopod femur, arising cephalad of the base of the solenomerite. However, as *hilaris* and *mutilatus* have a distinct rounded protrusion at the corresponding place, this character loses much of its importance.

Another conspicuous feature of *Agnesia nodulipes* are the ventral tubercles of several podomeres of a number of legs. Similar tubercles, however, have been observed in *Anoplodesmus hilaris*, although they are somewhat less obvious in that species. The description of *mutilatus,* unfortunately, is not concrete on this point.

All things considered, I prefer to bring *hilaris* and *mutilatus* under the heading *Agnesia* rather than create for them a new, necessarily weakly defined genus.

As for the present reference to *Agnesia* of the two species from Burma described by POCOCK, it is quite easy to see that *doriae* must be closely related to *hilaris.* The gonopods have the same general morphology, and many other non-gonopod characters appear to be in close agreement, e.g., the general structure of the legs of the male, including the ventral tubercles. The other species, *silvestris,* on the whole may seem a little more disjunct from the rest, yet its gonopods prove its close relationship with *hilaris*, *mutilatus* and *doriae.*

In recapitulation, the genus *Agnesia* now consists of the following species:

Agnesia nodulipes Attems, 1953 (Mém. Mus. nat. Hist. nat. (n.s., A) 5 : 174, fig. 70—74) — Indochina.

Agnesia hilaris (Attems, 1937) (Tierreich 68 : 105, fig. 136; 1938, Mém. Mus. nat. Hist. nat. (n.s.) 6 : 215, fig. 39—41) — Indochina.

Agnesia mutilata (Attems, 1953) (Mém. Mus. nat. Hist. nat. (n.s., A) 5 : 163, fig. 45—46) — Indochina.

Agnesia doriae (Pocock, 1895) — Burma.

Agnesia silvestris (Pocock, 1895) — Burma.

A slight discrepancy in the gonopod terminology still needs some explanation. In his descriptions of *hilaris* and *mutilata,* ATTEMS points out that a postfemoral region is not demarcated in the gonopods of these two species. On the other hand, he maintains that the tibiotarsus of both species is distinctly subdivided into a tibia and a tarsus. According to my interpretation, however, the so-called tibial part of the tibiotarsus represents the postfemoral region of the gonopods. The tarsal section of the tibiotarsus according to ATTEMS's interpretation, in my opinion constitutes the whole of the tibiotarsus.

In his description of the gonopods of *nodulipes*, ATTEMS likewise states that a postfemoral region is not demarcated. In this case he designates as tibiotarsus what actually seems to be the postfemur (whether this is marked off from the femur or not, needs to be verified) and the tibiotarsus, together.

In consequence of his interpretation, ATTEMS named tibial or tibiotarsal processes what I have regarded here as postfemoral processes.

All this may seem a rather unimportant and arbitrary matter of interpretation. Actually, however, the present interpretation of the gonopod structure enables us at once to ascertain the relationship of *Agnesia* and *Oxidus* Cook, 1911.

The gonopods of *Oxidus gracilis* (C. Koch, 1847) have been more than once

adequately illustrated (see, for instance, ATTEMS, 1937 : 82, fig. 101; ATTEMS, 1940 : 273, fig. 1—2). On comparison of these drawings with the gonopod drawing of *Agnesia doriae* (fig. 5) it is easy to see that there exists a great resemblance in the configuration of the femoral and postfemoral regions in these two species. In *Oxidus,* however, the denomination of the parts of the gonopods by ATTEMS is almost entirely in agreement with the homologization adopted here for *Agnesia* ! It goes without saying that, whereas the actual names of the various parts of the gonopods are relatively unimportant, any inconsistency as regards the denomination renders a comparison of homologous structures practically impossible.

Although *Agnesia* thus seems quite closely related to *Oxidus*, there is an evident difference in the distal part of the gonopods: in *Oxidus* there is, aside from a postfemoral process (marked *Tib* in the cited drawings by ATTEMS, 1940), a long branch which may be regarded as a secondary process of the tibiotarsus (marked *Ti* by ATTEMS). Moreover, the ventral tubercles of the legs are lacking in *Oxidus.*

Also closely related to *Agnesia* appears to be the genus *Sichotanus* Attems, 1914, occurring in Eastern Siberia and Korea. In this genus the end of the gonopod femur has, cephalad of the course of the spermal channel, an elongate process directed meso-caudad, which reminds strongly of the corresponding process in *Agnesia nodulipes.* The lateral side of the distal end of the postfemoral region (whether a postfemur is demarcated or not is not clear) is cristate as in *Agnesia,* although more produced distad and projecting as a triangular process. The tibiotarsus in *Sichotanus* is typically curving laterad as in *Agnesia.*

In a way related to *Agnesia* appears to be, furthermore, *Sundanina sigma* Attems, 1953, from Indochina. The gonopods of this species seem to represent a somewhat simplified *Agnesia* type. They have the typically curved tibiotarsus, a demarcated postfemoral region which at the caudal side of the distal end is produced into a little spine, which strongly suggests a similar spine in *Agnesia nodulipes.* Other postfemoral processes are lacking, and it is not clear whether or not the postfemur is laterally cristate.

It must be emphasized here, and it will be evident from the preceding lines, that the whole matter of defining the interrelationships of these East Asiatic paradoxosomatid genera is still extremely difficult and unsatisfactory, due partly to the inadequate exploration of the region and partly to the shortcomings of many of the descriptions.

KEY TO THE SPECIES OF *Agnesia*

1. Gonopod femur, cephalad of the base of the solenomerite, produced into a spiniform process. Some legs with ventral tubercles in the five distal podomeres .... *A. nodulipes* Att.

— Gonopod femur, cephalad of the base of the solenomerite, with a rounded protrusion. Only up to two podomeres provided with ventral tubercles 2

2. Gonopod postfemur with a single small process .... *A. doriae* (Poc.)

— Gonopod postfemur with an elongate process or with two processes 3

3. Prefemur of the pregonopodial legs not conspicuously incrassate. Gonopod postfemur with a single process .... *A. silvestris* (Poc.)

— Prefemur of the pregonopodial legs much incrassate, dorsally strongly convex. Gonopod postfemur with two processes 4
4. Width 5.0 mm. Lateral border of the lateral keels with one distinct indentation .... *A. hilaris* (Att.)
— Width 2.8 mm. Lateral border of the lateral keels with two indistinct indentations .... *A. mutilata* (Att.)

Agnesia doriae (Pocock)

1895 *Orthomorpha doriae* Pocock, Ann. Mus. civ. Stor. nat. Genova 34 : 823, fig. 19—19a.
1937 *Orthomorpha* (*O.*) *doriae* ; Attems, Tierreich 68 : 80.

Material.

This species was based on an unrecorded number of specimens from Yado, Biapo, Meteleo, and Puepoli, all collected by FEA. The type, according to POCOCK, came from Meteleo. This material now seems to be scattered over several museums. WEIDNER (1960) mentions three paratypes from Puepoli in the Hamburg Museum. In the British Museum I noted several years ago four specimens.

In the Genoa Museum I studied the following material: Meteleo, Carin Cheba, 900—1100 m, 1 ♂, 1 ♀; Yado, 1 ♂, 1 ♀; Carin Cheba, 900—1100 m, 2 ♂, 1 ♀, 1 juv. ♂. The male specimen from Meteleo I have selected as lectotype, the others I labelled as paratypes.

Description.

Colour. — POCOCK described the colour of the head and the dorsal surface as piceous or very deep brown; this has faded now to dull brown.

Width. — ♂ : 3.2 mm; 2.9 mm; 3.4 mm, 2.9 mm. ♀ : 3.4 mm; 3.6 mm; 3.3 mm. Juv. ♂ with 19 somites: 2.3 mm (sequence in the order of the above enumeration).

Head and antennae. — Labral emargination rather deep and moderately wide; labrum tridentate. Clypeus moderately convex, rather strongly impressed towards the labrum; the lateral border widely rounded, a little concave near the labrum. Headplate moderately shiny, rather densely setiferous up to above the antennal sockets; vertex somewhat rugulose, with three pairs of hairs. Antennal sockets separated by the diameter of a socket, or by nearly three quarters of the length of the 2nd antennomere. Postantennal groove rather deep; the wall in front rather prominent. Vertex moderately convex, distinctly demarcated from the frontal region by a transverse depression. Vertigial sulcus rather well impressed, running downward to just above the level of the antennal sockets. Antennae of moderate length, rather stout, somewhat clavate. Pubescence rather dense proximally to dense distally. Length of antennomeres: $2 = 3 > 4 > 5 > 6$; the 6th antennomere nearly three quarters of the length of the 2nd.

Collum. — Distinctly wider than the head, subtrapezoidal in dorsal outline. Anterior border faintly concave in the middle, evenly convex towards the lateral sides. Posterior border weakly concave, faintly rounded or almost straight laterally and with a notch above the lateral rounding. Lateral border widely and symmetrically rounded, with a weak setiferous notch cephalad. Surface shiny, very faintly rugulose, some hairs may be present and are situated on faint prominences.

Marginal rim laterally narrow. Middle weakly transversely convex, more convex laterally, but concave at the base of the lateral keels which are raised a little but do not reach a horizontal level.

Somites. — Constriction rather weak. Prosomites silky, sharply demarcated from the stricture. Stricture of moderate width, finely but distinctly ribbed dorsally, indistinctly striolate below the level of the lateral keels. Metatergites shiny, irregularly rugulose. Transverse furrow present from the 5th to the 18th somite, weakly indicated on the 4th somite, rather deeply and widely impressed. In most somites also a faint median furrow. Behind the stricture a transverse row of four flattened granules, which are setiferous only in a few anterior and posterior somites. In front of the caudal margin of the tergites a similar row of four granules, which, however, are less distinct than those of the anterior row. In the 18th somite only the two rows are equally distinct. Sides finely and densely granular. Pleural keels of the 2nd to 4th somites represented by distinct, somewhat curved ridges which are caudally produced into an acute, pointed triangular lappet which projects caudad of the posterior margin of the somites. From the 5th somite onwards there is only a triangular lappet near the posterior margin of the segments which projects a little behind that margin. In the 16th somite the lappet does not project behind the margin; in the 17th somite the lappet is indicated weakly.

Lateral keels. — (fig. 1). 2nd somite a little wider than the collum, and distinctly wider than the 3rd somite. 4th somite as wide as the 3rd. Keels of the 2nd somite a little below the level of those of the 3rd, horizontal. Anterior margin widely convex; the latero-anterior edge obtusely angular, produced into a blunt lateral tooth at the posterior side of which arises a hair. Lateral margin widely rounded, with two indentations and the indication of a third. Posterior border widely rounded; the latero-posterior edge about right-angled, projecting caudad of the posterior border of the somite. Marginal rim narrow, weakly defined except along the anterior border. Keels of the 3rd and 4th somites subsimilar, those of the 3rd anteriorly rather widely rounded, those of the 4th more widely rounded; the lateral borders in both somites faintly convex, with two indentations, the first of which bears a hair. Posterior edges projecting behind the posterior margins in both somites. Marginal rims thicker than those of the keels of the 2nd somite. The keels raised slightly above the horizontal level. Keels of the 5th and subsequent somites all distinctly raised above the horizontal level but not above the middorsal level. Anterior borders more or less widely rounded, the lateral borders weakly convex to practically straight, with two indentations. Posterior edges projecting caudad of the margin of the somites. In subsequent segments the edges become more and more acute-angled and more pointed, in particular in the 15th, 16th and 17th somites, the posterior points scarcely directed mesad. Marginal rim of the keels rather thick dorso-ventrally. Pores laterad and slightly dorsad, situated dorso-caudad of the second tooth in a distinct, elongate excavation of the rim.

Sternites and legs. — Sternites of middle somites one and one eighth times longer than broad. Cross impressions distinct, moderately impressed, the transverse furrow scarcely deeper than the longitudinal one. No distinct sternal cones, though traces of these may be visible. Pubescence rather dense to moderate. Sternite of the 5th somite with a short, broad process, two times broader than long, the middle

weakly incised. In lateral aspect the process has a low conical outline. Anterior side densely setiferous, without brush. Transverse furrow and longitudinal furrow in the posterior part of the sternite weakly impressed, the posterior part otherwise without particulars. Sternite of the 8th somite deeply excavated medially, although

Fig. 1—5. *Agnesia doriae* (Pocock), lectotype ♂. — 1: left side of the 10th and 11th somites, dorsal aspect. 2 : right leg of the 7th somite. 3: right leg of the 2nd pair of the 16th somite. 4: postfemur and tibia of same. 5: right gonopod, mesal aspect

not yet level with the ventral side of the metasomal ring. Pubescence moderate, near the base of the coxae a tuft of setae. Sternites of the 7th and 8th somites without particulars. Legs (fig. 2—4) rather long, rather stout. Prefemora strongly incrassate, much convex dorsally, except in the last two pairs of legs. Femora arched. Last two pairs of legs somewhat shorter than the preceding legs. The legs of the 6th or 7th to 17th somites are provided with postfemoral tubercles, those of the 8th to 17th somites also with tibial tubercles. Moreover, the ventral side of the femora, postfemora and tibiae is rather densely covered with fine granules. Pubescence of the legs weak to moderate dorsally and dense ventrally, especially in the anterior legs. No typical brushes. Length of podomeres: $3 > 6 > 2 > 5 = 4$; the 6th podomere just over three quarters of the length of the 3rd.

Anal somite. — Epiproct rather thick; the sides converging concavely to become practically parallel near the end. Lateral preterminal setiferous tubercles distinctly developed. The end with a pair of well developed rounded terminal knobs, rather narrowly separated. Valves with moderately high and rather narrow rims, rugulose, the setiferous tubercles flattened. Hypoproct semicircular, the tubercles distinctly developed, projecting a little outside the margin but not equalling the middle.

Gonopods. — (fig. 5). Coxa with an anterior setiferous area; the distal end scarcely bent caudad. Demarcation between prefemur and femur very oblique. Postfemur with a small, slightly bifid, posterior process; the lateral carina not serrulate.

Female. — Similar to the male, but differing, aside from the usual sexual characters, as follows. Antennal sockets separated by three quarters of the 2nd antennomere. Sides of the collum not raised. Dorsum more convex. Pleural keels projecting behind the margin of the somite only in the 2nd and 3rd somites, slightly produced caudad in the 4th and 5th somites. From the 6th to the 14th somite only a minute, obtuse-angled lappet near the posterior margin. These lappets are slightly indicated only in the 15th to 17th somites. Lateral keels comparatively less developed and less produced caudally; the posterior edges projecting behind the margin in the 2nd to 4th and in the 9th and subsequent somites, particularly in the 16th and 17th. Sternites of the middle somites over one and one-quarter times broader than long. Legs rather slender, the prefemora not incrassate, the femora straight. No postfemoral and tibial tubercles, no granules. Pubescence moderate, rather dense in the distal podomeres only. Relative length of podomeres as in the male.

Remarks.

In the incrassate prefemora of the anterior legs of the male this species approaches *A. hilaris* (Att.) and *A. mutilata* (Att.). The male of *hilaris,* moreover, has the same distribution of the ventral tubercles of the legs, similar granulation of the ventral side of the podomeres, and the arched femora. Unfortunately, the description of *mutilata* remains silent on these points.

From these two species, *doriae* is at once distinguished by only one small postfemoral process in the gonopods, as against two in *hilaris* and *mutilata.* The metatergites in the latter two species apparently lack the two transverse rows of tubercles on the metatergites. From *hilaris, doriae* differs furthermore by its smaller size and by the two instead of one indentations of the border of the lateral keels.

Agnesia silvestris (Pocock)

1895 *Orthomorpha silvestris* Pocock, Ann. Mus. civ. Stor. nat. Genova 34 : 824.

Material.

This species was based on two specimens, which are both in the Genoa Museum: Village of Thao, Carin Ghecu, 1200—1400 m, IV. 1888, 1 ♂, 1 ♀. The male I have labelled as lectotype, the female as paratype.

Description.

Colour. — Pitch black according to POCOCK, but now faded to the same dull brown colour as *doriae.*

Width. — ♂ : 3.6 mm. ♀ : 4.0 mm.

Head and antennae. — As in the preceding species, but the antennal sockets separated by a little more than the diameter of a socket or by three fifths of the length of the 2nd antennomere.

Collum. — As in *doriae*, but the lateral border without a setiferous notch. The lateral keels less raised.

Somites. — Stricture rather broad, not ribbed, but dorsally only indistinctly striate and laterally without sculpture. Surface of metatergites duller than in *doriae*, irregularly rugulose. No distinct tubercles in front of the transverse furrow; the tubercles along the posterior border indistinct as in *doriae.* Transverse furrow present from the 5th to the 17th segment, more sharply but less deeply impressed than in *doriae.* Pleural keels projecting behind the margin of the somite also in the 17th somite, and indicated also in the 18th.

Lateral keels. — (fig. 6). 2nd somite wider than the collum, and narrower than the 3rd. Keels of the 2nd somite a little declined. Lateral border without indentations, only with a tooth at the latero-anterior edge. Latero-posterior edge obtuse, narrowly rounded. Keels of the 3rd somite horizontal. The latero-anterior tooth very weak, no lateral indentations. Keels of the 4th somite without indentations. Keels of the 5th and subsequent somites horizontal. The lateral borders with only one single, often very weak, indentation. The posterior edges becoming gradually more acute-angled, but not pointed as in *doriae.* Pores situated much more dorsad than in *doriae.*

Sternites and legs. — Sternites of middle somites about as long as wide. Post-gonopodial sternites with obtuse cones at the base of the legs, those at the base of the caudal legs of each somite pointed and directed caudad. Pubescence moderate. Process of the sternite of the 5th somite shorter than in *doriae.* Sternite of the 6th somite only weakly excavated. Legs (fig. 7) with prefemora not conspicuously incrassate, the femora scarcely arched. Legs of the 6th to 16th somites provided with tibial and tarsal tubercles, weak in the 16th somite. Tibial and tarsal brushes present up to about the middle of the body, dense in the pregonopodial legs.

Anal somite. — Epiproct without lateral preterminal tubercles and with weakly developed terminal knobs. Hypoproct with an obtuse-angled median edge; the setiferous tubercles less distinct than in *doriae* and not projecting outside the margin.

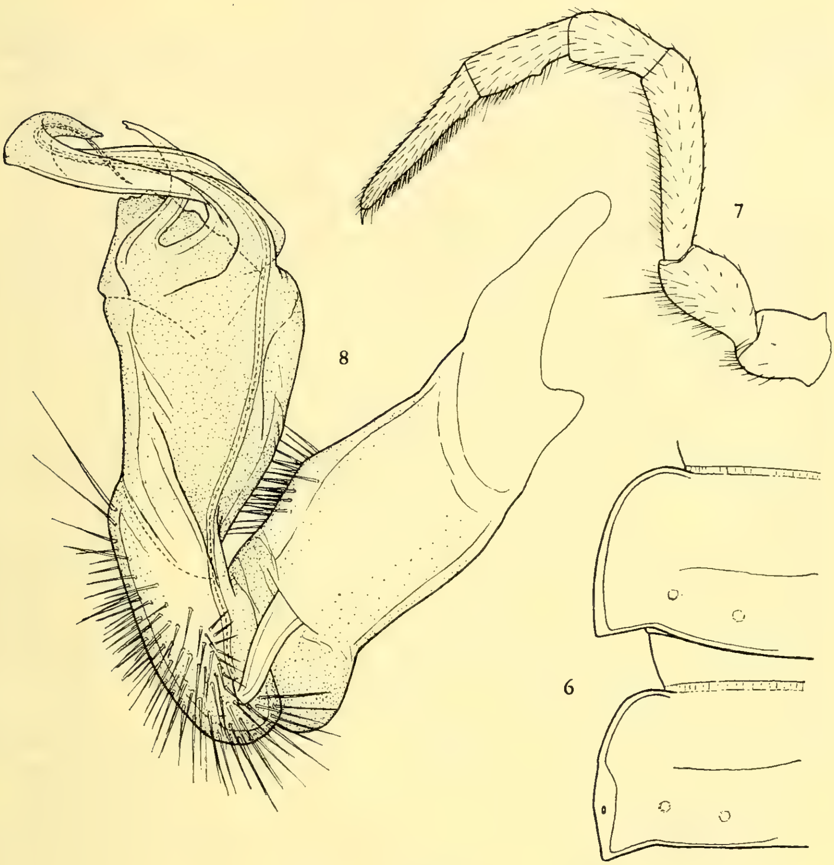


Fig. 6—8. *Agnesia silvestris* (Pocock), lectotype ♂. — 6: left side of the 11th and 12th somites, dorsal aspect. 7: right leg of the 7th somite. 8: right gonopod, mesal aspect

Gonopods. — (fig. 8). The femur shorter and broader than in *doriae*. Postfemur with an elongate, sigmoid process; the lateral carina serrulate.

Female. — Similar to the male, but, aside from the usual sexual features, differentiated as follows. Antennal sockets separated by three quarters of the length of the 2nd antennomere. Sides of collum not raised. Dorsum more convex. Pleural keels projecting behind the posterior margin in the 2nd to 5th somites only. From the 8th to the 16th somite the lappet is obtuse-angled, in the 17th it is almost absent. Lateral keels comparatively less developed. The latero-anterior indentations are distinct in the 2nd and subsequent somites, but are scarcely noticeable in some somites in the caudal half of the body. Posterior edges of the keels not or scarcely projecting behind the margin in the 4th to 8th somites. Sternites in the somites of the middle of the body over one and two fifths times broader than long. Sternal cones very weakly developed. No ventral tubercles in the podomeres. Pubescence of the legs as in the male. The legs stouter than in the female of *doriae*.

Remarks.

In the gonopods this species appears somewhat disjunct by the rather conspicuous development of the lateral crest of the postfemur. For the rest, the whole structure of the gonopods is in close agreement with the other species of *Agnesia.*

Anoplodesmus Pocock

1895 *Anoplodesmus* Pocock, Ann. Mus. civ. Stor. nat. Genova 34 : 797.
1898 *Sulciferus* Attems, Denkschr. k. Akad. Wiss., math.-naturw. Cl., 67 : 346.
1936 *Jonespeltis* Verhoeff, Rec. Ind. Mus. 38 : 115.
1937 *Anoplodesmus* in part; Attems, Tierreich 68 : 98.

Type-species.

Anoplodesmus : *Anoplodesmus anthracinus* Pocock, 1895, by subsequent designation by SILVESTRI, 1896 (Ann. Mus. civ. Stor. nat. Genova 36 : 197).

Sulciferus : *Anoplodesmus anthracinus* Pocock, 1895, by present designation.

Jonespeltis : *Jonespeltis splendidus* Verhoeff, 1936, by monotypy.

Remarks.

The name *Sulciferus* was proposed by ATTEMS for a kind of "supergenus" to embrace *Anoplodesmus* Poc., *Prionopeltis* Poc. and *Levizonus* Att. As regards the status of the name ATTEMS was rather inconsistent. Although *Anoplodesmus, Prionopeltis* and *Levizonus* were regarded as subgenera, they were treated as generic names in connection with the names of the species. Later, *Sulciferus* was completely discarded and soon entirely forgotten.

As no type-species has been designated previously, I have thought it best to make *Sulciferus* an objective synonym of *Anoplodesmus* by designating *anthracinus* as type.

After the reallocation of *Anoplodesmus hilaris* Att. and *A. mutilatus* Att. in the genus *Agnesia, Anoplodesmus* has become a fairly homogeneous genus. It has a discontinuous range, with a group of species occurring in Ceylon and peninsular India and another group living in an area which extends from Burma to Sumatra. One species, moreover, has been recorded from Mauritius, but this occurrence is undoubtedly due to introduction.

The gonopods of the species of this genus are quite similar and generally do not give distinct specific characters. Moreover, a slight alteration of the position of the gonopod when studied may change the outline to such an extent that an uncritical comparison of the published drawings inevitably must lead to entirely wrong conclusions. A correct identification of the species is furthermore impeded by the vagueness of most descriptions.

Inadequacy of the pertinent descriptions apparently was the ground for ATTEMS' decision (1898, 1937) to synonymize *Anoplodesmus striolatus* Pocock with *A. luctuosus* (Peters), and *A. splendidus* (Verhoeff) with *A. anthracinus* Pocock, without much of a discussion. For mere geographical reasons, of course, it is improbable that a species from South Tenasserim is identical with one from Ceylon, or a species from South India with one from Burma, even when the descriptions upon comparison fail to give distinctive characters. Such premature acts of synonymizing only add to the confusion.

In view of the above it may be useful to give here a brief account of the known species of *Anoplodesmus.*

From South India the following species have been described:

Anoplodesmus tanjoricus (Pocock)

1892 *Leptodesmus tanjoricus* Pocock, J. Bombay nat. Hist. Soc. 7 : 147, pl. 1 fig. 3—3b. (1)
1932 *Anoplodesmus tanjoricus*; Carl, Rev. Suisse Zool. 39 : 460, fig. 55—57. (2)
1936 *Anoplodesmus tanjoricus*; Attems, Mem. Ind. Mus. 11 : 206. (3)
1937 *Anoplodesmus tanjoricus*; Attems, Tierreich 68 : 100, fig. 128—129.
Distribution. — India : Tanjore (1, 3), Coimbatore (2), Trivandrum (3).

Anoplodesmus splendidus (Verhoeff)

1936 *Jonespeltis splendidus* Verhoeff, Rec. Ind. Mus. 38 : 115, pl. 7 fig. 18—19.
Distribution. — India: Kovalam.

Anoplodesmus insignis Attems

1936 *Anoplodesmus insignis* Attems, Mem. Ind. Mus. 11 : 207, fig. 33b—33c. (1)
1937 *Anoplodesmus insignis* ; Attems, Tierreich 68 : 101, fig. 130.
Distribution. — India : Courtallam (1).

These three species are extremely closely related, and, as far as descriptions go, it is impossible to find reliable points of difference.

The gonopods, which have a more erect telopodite than those of the Ceylon species, apparently lack diagnostic features.

As regards the presence and development of the femoral processes of the 4th to 7th legs of the male, data are vague and sometimes contradictory. For *tanjoricus*, POCOCK described femoral prominences in the 5th, 6th and 7th legs. ATTEMS (1936), however, in his description of this species, which was based partly on topotypical material, stated the presence of these processes in the 4th to 7th legs, and made this a distinctive character in respect of his *insignis*, in which processes occurred in the 5th to 7th legs.

CARL (1932) studied material from two localities, from Coimbatore and from "India" without nearer indication, which he referred to *tanjoricus.* In these two series he observed differences in the development of the femoral processes, which, however, were not illustrated and therefore cannot be evaluated.

On comparison of the various descriptions of *tanjoricus*, *splendidus* and *insignis* further differences seem to exist in the outline of the lateral keels, in the development of the pleural keels, and in the shape of the process of the sternite of the 5th somite of the male. But as none of these characters have been illustrated it is not possible to estimate their significance. On the other hand, these discrepancies in the descriptions, vague as they may be, preclude from synonymizing the three species, and only a re-examination of the types and other material can solve the problem of how many species, or subspecies, are actually involved.

The following species have been described from Ceylon:

Anoplodesmus luctuosus (Peters)

1864 *Polydesmus (Oxyurus) luctuosus* Peters, Monatsber. k. Akad. Wiss. Berlin 1864 : 532. (1)
1898 *Anoplodesmus luctuosus* ; Attems, Denkschr. k. Akad. Wiss., math.-naturw. Cl., 67 : 348, pl. 5 fig. 106.
1937 *Anoplodesmus luctuosus* ; Attems, Tierreich 68 : 104, fig. 134.
Distribution. — Ceylon : Rambodde. (1)

Anoplodesmus saussurii (Humbert)

1865 *Polydesmus Saussurii* Humbert, Mém. Soc. phys. Hist. nat. Genève 18 : 26, pl. 2 fig. 8—8e. (1)
1898 *Prionopeltis Saussurei* ; Attems, Denkschr. k. Akad. Wiss., math.-naturw. Cl., 67 : 354, pl. 5 fig. 103—104. (2)
1902 *Prionopeltis Saussurei* ; Carl, Rev. Suisse Zool. 10 : 593. (3)
1922 *Prionopeltis Saussurei* ; Carl, Zool. Jahrb. (Syst.) 44 : 566. (4)
1930 *Anoplodesmus attemsii* Verhoeff, Zool. Anz. 89 : 206. (5)
1936 *Prionopeltis saussurei* ; Verhoeff, Rec. Ind. Mus. 38 : pl. 7 fig. 16—17.
1936 *Anoplodesmus saussurei* ; Attems, Mem. Ind. Mus. 11 : 207, fig. 33a.
1937 *Anoplodesmus saussurei* ; Attems, Tierreich 68 : 102, fig. 131—133. (6)
1937 *Anoplodesmus saussurei* ; Verhoeff, Zool. Anz. 120 : 317. (7)
Distribution. — Ceylon : Peradeniya (1, 2, 3, 4, 7), Kandy (2, 5), Paradise (6).

Anoplodesmus thwaitesii (Humbert)

1865 *Polydesmus Thwaitesii* Humbert, Mém. Soc. phys. Hist. nat. Genève 18 : 27, pl. 2 fig. 9—9b. (1)
1892 *Leptodesmus thwaitesii* ; Pocock, J. Bombay nat. Hist. Soc. 7 : 147. (2)
1902 *Prionopeltis Twaithesii* (sic); Carl, Rev. Suisse Zool. 10 : 593. (3)
1937 *Anoplodesmus thwaitesii* ; Attems, Tierreich 68 : 103.
Distribution. — Ceylon : Peradeniya (1).

Anoplodesmus humberti (Carl)

1902 *Prionopeltis Humberti* Carl, Rev. Suisse Zool. 10 : 590. (1)
1937 *Anoplodesmus humberti* ; Attems, Tierreich 68 : 103.
Distribution. — Ceylon : Peradeniya. (1)

The gonopods of these four species have the telopodite more rounded, which distinguishes them well from those of the Indian mainland forms. To what extent they may serve for discriminating the Ceylon species as against each other cannot be decided on the basis of the published drawings. Moreover, the gonopods of *thwaitesii* and *humberti* have not yet been illustrated.

ATTEMS (1898) studied the types of *luctuosus.* As regards the presence or absence of the femoral processes of the legs of the male he made no definite statement, but, as he brought *A. striolatus* Pocock into the synonymy of *luctuosus*, and as *striolatus* lacks these processes, one may assume that they are missing also in *luctuosus*.

It is not clear if HUMBERT's types of *saussurii* were ever re-examined. They do

not seem to be in the Geneva Museum, otherwise CARL (1902) would have mentioned this. ATTEMS (1898) redescribed the species after material from the type locality in the Vienna Museum, but whether or not this included also HUMBERT's types is not clear.

Although *saussurii* has been recorded frequently, and should be the best known species of the genus, the available descriptions and drawings are not yet entirely satisfactory. According to VERHOEFF (1937), *saussurii* shows a certain sexual dimorphism in that the females have the metatergites granulose-subcoriaceous instead of almost smooth as in the males. For that reason he brought his *attemsii*, which was based on a female, into the synonymy of *saussurii*. Other authors, however, have not confirmed this dimorphism.

The name of this species has been consequently misspelled as *saussurei* instead of *saussurii*.

A. thwaitesii appears to have a characteristic colour pattern and is distinct from *saussurii* in having only the 7th leg of the male provided with a ventral femoral process, whereas *saussurii* has a similar modification in the 6th leg also. *A. thwaitesii* differs from *saussurii* also in size and in the outline of the lateral keels.

A. humberti appears very closely related to *saussurii*. It is said to differ in the sculpture of the metatergites, smaller size, the outline of the lateral keels, and in the presence of a ventral prominence in the femur of the 5th leg of the male, but as these characters have not been illustrated they are difficult to evaluate.

Several species, probably pertaining to *Anoplodesmus*, have been described from Ceylon in addition to the four mentioned above. As they have been based on female specimens or even on juveniles their recognition is practically impossible without the study of material from the type localities.

Anoplodesmus layardi (Humbert)

1865 *Polydesmus Layardi* Humbert, Mém. Soc. phys. Hist. nat. Genève 18 : 28, pl. 3 fig. 10—10b.
Distribution. — Ceylon : Peradeniya.

Anoplodesmus inornatus (Humbert)

1865 *Polydesmus inornatus* Humbert, Mém. Soc. phys. Hist. nat. Genève 18 : 30, pl. 3 fig. 11—11c. (1)
1892 *Leptodesmus inornatus* ; Pocock, J. Bombay nat. Hist. Soc. 7 : 147. (2)
Distribution. — Ceylon : Peradeniya (1), Pundaloya (2).

Anoplodesmus sabulosus Attems

1898 *Anoplodesmus sabulosus* Attems, Denkschr. k. Akad. Wiss., math.-naturw. Cl. 67 : 351.
Distribution. — Ceylon : Kandy.

From Mauritius VERHOEFF described the following subspecies of *saussurii*.

Anoplodesmus saussurii (Humbert) subsp. mauritianus Verhoeff

1939 *Anoplodesmus saussurei mauritianus* Verhoeff, Jena. Zeitschr. Naturw. 73 : 66, fig. 39.
Distribution. — Mauritius.

VERHOEFF distinguished this subspecies from *saussurii* by slight differences in the apical portion of the gonopod telopodite. Probably, however, these were caused by a slightly different position of the gonopod, and the subspecific name is better discarded. Obviously *saussurii* has been introduced into Mauritius by human agency.

From the Eastern area of the genus the following species have been described:

Anoplodesmus anthracinus Pocock

See below.

Anoplodesmus striolatus Pocock

1895 *Anoplodesmus striolatus* Pocock, Ann. Mus. civ. Stor. nat. Genova 34 : 799, fig. 6—6a.
Distribution. — Burma : South Tenasserim.

Anoplodesmus pinguis Pocock

See below.

Anoplodesmus obesus Pocock

See below.

Anoplodesmus dyscheres Attems

1898 *Anoplodesmus dyscheres* Attems, Denkschr. k. Akad. Wiss., math.-naturw. Cl., 67 : 349, pl. 5 fig. 102. (1)
1937 *Anoplodesmus dyscheres* ; Attems, Tierreich 68 : 104, fig. 105.
Distribution. — Sumatra : Bindjei (1).

Anoplodesmus kathanus (Chamberlin)

1921 *Prionopeltis kathanus* Chamberlin, Ann. Mag. nat. Hist. (9) 7 : 80. (1)
1937 *Anoplodesmus kathanus* ; Attems, Tierreich 68 : 106.
Distribution. — Burma : Katha (1).

In the gonopods of these species we can also distinguish between a more erect telopodite and a more rounded telopodite. The erect type is found only in *anthracinus*, and this species indeed appears to be quite closely related to the three species occurring in South India: *A. tanjoricus*, *A. splendidus* and *A. insignis*.

The other four species have a more strongly curved gonopod telopodite, and they may be more closely related to the group of species occurring in Ceylon. The Ceylonese species, however, differ by having a deeper incision between the solenophore and the secondary lamina of the tibiotarsus.

A. striolatus was brought into the synonymy of *luctuosus* by ATTEMS, but aside from the difference in the gonopods mentioned above, it is a much smaller species — width 5.0 mm against 7.0 mm for *luctuosus*.

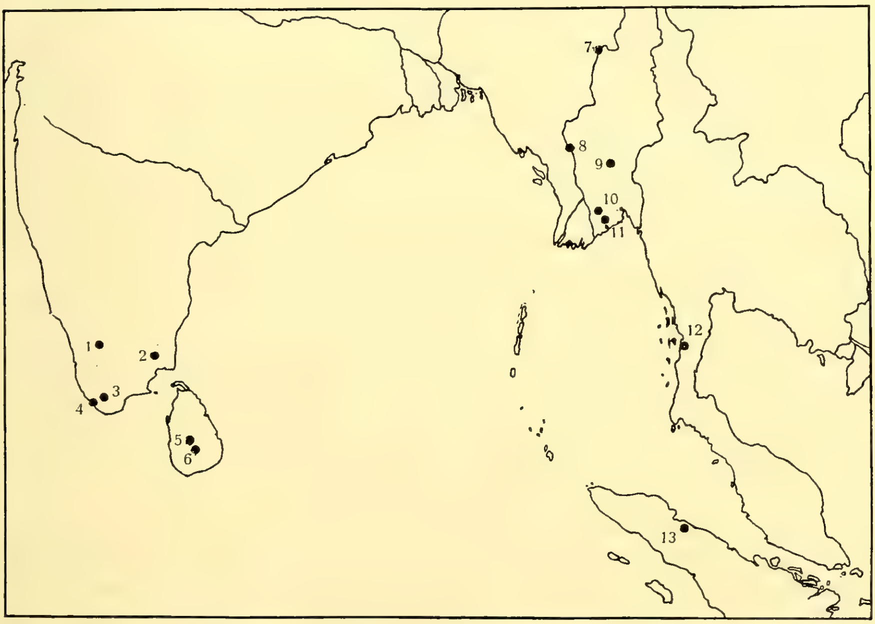
A. dyscheres must be very closely related to *striolatus*, and both species should be re-examined to determine the differential characters.

A. kathanus also needs to be re-examined before anything can be said on its relationship. ATTEMS (1937) considered it perhaps most closely related to *luctuosus*. Because of what CHAMBERLIN wrote of the sternal process of the 5th somite I presume that it may come nearest to *anthracinus*.

Of the species which ATTEMS (1937) referred to *Anoplodesmus* there remain *A. indus* (Chamberlin, 1920), *A. atopus* (Chamberlin, 1920), which, however, do not belong to *Anoplodesmus* but to *Chondromorpha* Silvestri, 1897, and *A. spectabilis* (Karsch, 1881).

The identity of *spectabilis*, however, is totally obscure. If we may trust the gonopod drawing by KARSCH it does not belong to *Anoplodesmus* at all.

The area of *Anoplodesmus* as it is known today corresponds with a well-known discontinuous pattern: Ceylon and Southern India versus tropical East Asia. As it is probably the first definitely established example of this pattern in Diplopoda, I give here a map of the region showing the localities where the species of the genus have been collected.



Map showing the localities from which the species of *Anoplodesmus* have been described or recorded. — 1. Coimbatore (*tanjoricus*). 2. Tanjore (*tanjoricus*, type). 3. Courtallam (*insignis*, type). 4. Trivandrum (*tanjoricus*), Kovalam (*splendidus*, type). 5. Kandy (*saussurii*; *sabulosus*, type), Peradeniya (*saussurii*, type; *thwaitesii*, type; *humberti*, type; *layardi*, type; *inornatus*, type). 6. Rambodde (*luctuosus*, type), Pundaloya Valley (*thwaitesii*; *inornatus*). 7. Katha (*kathanus*, type)). 8. Minhla (*anthracinus*). 9. Meteleo (*obesus*, type), Puepoli (*obesus*). 10. Palon (*pinguis*). 11. Rangoon (*anthracinus*, type, *pinguis*, type). 12. South Tenasserim (*striolatus*, type). 13. Bindjei (*dyscheres*, type)

KEY TO THE SPECIES OF *Anoplodesmus*

Excluded are *A. layardi* (Humb.), *A. inornatus* (Humb.), *A. sabulosus* Att., and *A. kathanus* (Chamb.).

1. Species from Burma and Sumatra 2
— Species from India and Ceylon 5
2. Male with femoral prominences in the (4th) 5th to 7th legs. Gonopod telopodite weakly curved, the secondary branch of the tibiotarsus pointing mainly distad. Width 4 to 5 mm. .... *A. anthracinus* Poc.
— Legs of male without femoral prominences. Gonopod telopodite more strongly curved, the secondary branch of the tibiotarsus pointing manly caudad. Width 5 to 6.5 mm 3
3. Lateral keels of most somites with the posterior border about transverse on the axis of the body .... *A. striolatus* Poc., *A. dyscheres* Att.
— Lateral keels of most somites with the posterior border directed obliquely forward 4
4. Posterior edges of keels rounded .... *A. obesus* Poc.
— Posterior edges of keels more pronounced .... *A. pinguis* Poc.
5. Male with femoral prominences in the (4th) 5th to 7th, 6th and 7th, or only in the 7th legs 6
— Legs of male without femoral prominences .... *A. luctuosus* (Pet.)
6. Femoral prominences only in the 7th leg. Width 8 mm. Colour brown with the margins of the lateral keels and the metatergites yellow; moreover, the metatergites have two transverse rows of six to eight yellow spots .... *A. thwaitesii* (Humb.)
— Femoral prominences in the 6th and 7th, or in the (4th) 5th to 7th legs. Width 4 to 7 mm. Colour different 7
7. Femoral prominences present only in the 6th and 7th legs .... *A. saussurii* (Humb.)
— Femoral prominences present in the (4th) 5th to 7th legs 8
8. Metatergites with a transverse row of eight to ten tubercles along the posterior margin and a similar row of six tubercles in front of the transverse furrow. Gonopod telopodite rather strongly curved .... *A. humberti* (Carl)
— Metatergites smooth or somewhat rugulose. Gonopod telopodite weakly curved 9
9. Sternal process of the 5th somite of the male broadly rounded and directed obliquely backward .... *A. insignis* Att.
— Sternal process of the 5th somite directed downward... *A. tanjoricus* (Poc.), *A. splendidus* (Verh.)

Anoplodesmus anthracinus Pocock

1895 *Anoplodesmus anthracinus* Pocock, Ann. Mus. civ. Stor. nat. Genova 34 : 798, fig. 5.
1898 *Anoplodesmus anthracinus* ; Attems, Denkschr. k. Akad. Wiss., math.-naturw. Cl., 67 : 349, pl. 5 fig. 113—114.
1937 *Anoplodesmus anthracinus* ; Attems, Tierreich 68 : 99, fig. 127 (excl. synonymy).

Material.

This species was based on an unrecorded number of specimens from Rangoon collected partly by OATES, partly by FEA. Apparently this type material is now spread over several museums. The specimen to be designated as lectotype must be in the British Museum. According to WEIDNER (1960) the Hamburg Museum has six paratypes.

The description published by ATTEMS in 1898, and the drawing published by that author in 1898 and 1937 were based on material from Rangoon in the Hamburg Museum. It seems likely that this was, in fact, the paratypical series mentioned by WEIDNER. Possibly, therefore, some material of the type series is in the Vienna Museum. At least ATTEMS may have retained a gonopod slide of the Hamburg material, like he used to do.

In the Genoa Museum there are now only four specimens of *anthracinus* from Rangoon, XII.1886, viz. 1 ♂ and 3 ♀. I have designated these as paratypes.

In the loan register of the Genoa Museum I found the evidence that SILVESTRI in 1902 borrowed two specimens which apparently were never returned. Probably, these are still in the SILVESTRI collection at Portici.

In addition to the typical material mentioned above, the Genoa Museum has a male specimen from Minhla, 1887, leg. G. B. COMOTTO. This specimen was not seen by POCOCK, but was stored under the in litteris name "Strongylosoma dissentaneum Silvestri".

Description.

Colour. — See POCOCK. The specimen from Minhla has lost its colour almost entirely.

Width. — ♂ : paratype 4.2 mm, ♂ from Minhla: 4.2 mm. ♀ : 4.8 mm, 3.9 mm, 3.9 mm.

Head and antennae. — Labrum widely and rather deeply emarginate, tridentate. Clypeus weakly convex, scarcely impressed towards the labrum; the lateral border widely rounded, weakly emarginate above the labrum. Headplate smooth and shiny, sparsely hairy up to the frontal region, the vertex hairless. Antennal sockets separated by somewhat less than one and one third of the diameter of a socket, or by slightly more than four fifths of the length of the 2nd antennomere. Postantennal groove widely and rather deeply concave; the wall in front moderately prominent. Vertex rather weakly convex; the sulcus moderately impressed, running downward to halfway between the antennal sockets. Antennae of moderate length, rather stout, scarcely clavate. Pubescence sparse in the proximal antennomeres to rather dense in the distal ones. Length of antennomeres: $2 = 3 > 4 = 5 > 6$; the 6th antennomere six sevenths of the length of the 2nd.

Collum. — (fig. 9). Distinctly wider than the head. Anterior border faintly convex, faintly concave at the base of the lateral keels; the lateral margin of the keels widely rounded towards the posterior edge. Posterior border widely emarginate, laterally straight, an obtusely rounded edge at the base of the lateral keels; the posterior border of the lateral keels widely emarginate. Latero-posterior edge very narrowly rounded, about right-angled. Surface shiny, polished, hairless, transversely evenly convex, the lateral keels slightly raised, although still rather

strongly declined. Marginal rim laterally rather broad, the premarginal furrow fading away towards the middle of the anterior border.

Somites. — Constriction rather weak. Prosomites polished. Stricture very narrow, not demarcated from the prosomites, dorsally finely beaded, laterally faintly striate down to the level of the stigmata. Metatergites smooth, polished, hairless. Transverse furrow present from the 5th to the 17th somite, weakly impressed, without sculpture. Sides smooth or a little rugulose; granulose up to the 5th somite. Pleural keels represented by distinct ridges in the 2nd and 3rd somites. In the 4th somite a rounded raised lappet, scarcely produced posteriorly. In the 5th somite a rounded, well developed ridge, dorsally demarcated by a furrow which curves upwards and runs parallel to the caudal margin of the somite towards the base of the lateral keel. In the following somites the pleural ridges disappear gradually; the furrow remains visible up to about the 12th somite.

Lateral keels. — (fig. 9—11). The 2nd somite scarcely wider than the collum, about as wide as the 3rd. The 4th somite a little narrower than the 3rd. Keels of the 2nd somite rather strongly declined. The anterior border widely convex, slightly thrust forward, a little shouldered at the base. Latero-anterior edge rather widely rounded, obtuse-angled. Lateral border widely rounded. Posterior border faintly convex, a little curved forward near the base of the keel. Latero-posterior edge narrowly rounded, about right-angled, produced a little caudad and projecting very slightly. Marginal rim rather broad, distinctly demarcated. Keels of the 3rd somite a little less declined than those of the 2nd, the anterior border shouldered at the base, but otherwise directed obliquely caudad. Posterior border practically straight. Latero-posterior edge narrowly rounded, very slightly acute-angled. The marginal rim thicker than in the 2nd somite. Keels of the 4th somite similar to those of the 3rd, but the latero-anterior angle more obtuse. Keels of the 5th and subsequent somites with the anterior margins a little shouldered at the base. The latero-anterior border widely, more or less evenly rounded, without distinct latero-anterior edge. Posterior edges rather narrowly rounded, obtuse-angled up to the 13th somite and in the 15th somite, the angle becoming a little acute in the 14th, 16th, and subsequent somites. From the 16th somite onwards the posterior edges project a little behind the posterior margin of the somites. Keels of the 5th somite a little declined, those of the 6th and following somites horizontal. Marginal rim dorsoventrally rather thick; the pores lateral in a distinct, oval concavity.

Sternites and legs. — Sternites of middle somites as long as wide. Cross impressions indistinct. The transverse furrow widely interrupted in the middle, distinct only between the coxal bases. Instead of a longitudinal furrow a wide and moderately deep excavation. Pubescence moderate, the hairs short. Sternite of the 5th somite normal between the posterior legs. Between the anterior legs a swelling, with on the middle a transverse ridge of about two thirds of the width between the coxae, rather thick, rounded, slightly emarginate in the middle. Pubescence normal. Sternite of the 6th somite caudally very slightly excavate, otherwise normal. Sternites of the 7th and 8th somites without particulars. Legs (fig. 12—13) rather long, stout. Pubescence moderate ventrally, absent dorsally, except in the distal podomeres. The two ultimate pairs distinctly shorter than the preceding ones, but not modified. Anterior legs more incrassate. The femora of the 5th and 6th legs

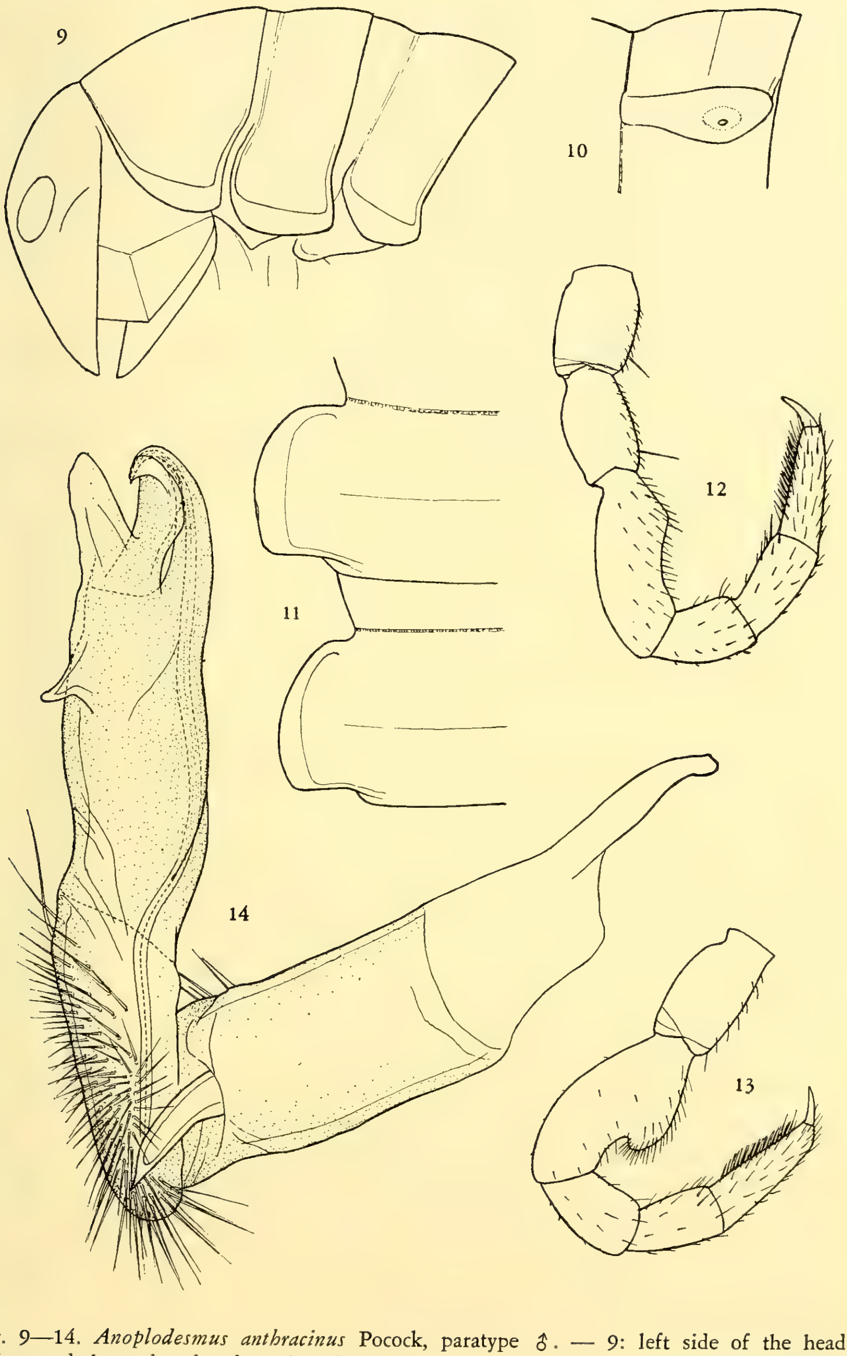


Fig. 9—14. *Anoplodesmus anthracinus* Pocock, paratype ♂. — 9: left side of the head, collum and the 2nd and 3rd somites, lateral aspect. 10: left side of the 10th somite, lateral aspect. 11: left side of the 10th and 11th somites, dorsal aspect. 12: 2nd leg of the 5th somite. 13: telopodite of the 2nd leg of the 6th somite. 14: right gonopod, mesal aspect

with a ventral conical swelling, of the 7th leg with a rounded process. Brushes of tibiae and tarsi present in the anterior legs but not conspicuously thick, thinning out in the postgonopodial legs and absent in the 2nd half of the body. Length of podomeres: $3 > 6 > 5 = 2 > 4$; the 6th podomere three fifths of the 3rd.

Anal somite. — Epiproct long, narrow, parallel-sided or even faintly constricted near the base. The end rounded, truncate, without terminal knobs. Ventral side convex. Basal and distal setiferous tubercles minute. Valves a little rugulose. The rims of moderate height and width. Setiferous tubercles large but low. Hypoproct subtriangular to almost evenly rounded, broad. The setiferous tubercles weakly developed, not projecting behind the border.

Gonopods. — (fig. 14). Coxa straight, of moderate width and length, with some latero-distal hairs. Coxal horn with a slender distal projection. Prefemur elongate, in one line with the axis of the acropodite, laterally distinctly, obliquely demarcated from the femur. Femur stout, slightly curved mesad. No postfemoral region demarcated. At the end, arising from the medio-posterior side, a small acuminate (post)femoral process directed mesad and a little proximad. Tibiotarsus laterally distinctly demarcated from the femoral region, consisting of a solenophorous part and a simple secondary lamella. The solenophore curving slightly mesad, the secondary lamella directed distad and a little mesad. Spermal channel running almost straight along the anterior side of the femur. Solenomerite stout, arising from the anterior side of the distal end of the femur, supported but not actually sheathed by the solenophore.

Female. — Differentiated from the male by the following characters, aside from the usual sexual ones. Antennal sockets separated by nine tenths of the length of the 2nd antennomere. Antennae relatively shorter, the 6th antennomere scarcely shorter than the 2nd. Body a little more robust, with the keels slightly less developed. 2nd, 3rd and 4th somites each somewhat wider than the preceding somites. Length of the sternites of the middle somites a little over four fifths of the width. Legs comparatively a little shorter, moderately slender. Length of podomeres: $3 > 6 > 2 > 5 = 4$. Epiproct relatively shorter, the sides slightly convergent.

Remarks.

According to POCOCK, this species has the femora of the legs of the 5th and 6th somites provided with inferior thickenings. In the material studied the anterior legs of the 5th somite definitely lack this modification. ATTEMS (1898) mentions only the process on the femora of the posterior legs of the 6th somite.

Either POCOCK had more than one species before him, or *anthracinus* is variable as regards the development of the femoral modifications, or POCOCK may have been in error. The first two alternatives seem somewhat improbable to me, but only the examination of the lectotype can solve this problem. ATTEMS probably overlooked the smaller processes of the posterior legs of the 5th, and the anterior legs of the 6th somite.

Among the species of *Anoplodesmus* occurring in Burma, Malaya and Sumatra, *anthracinus* stands rather isolated, although the enigmatic *A. kathanus* (Chamb.) may eventually prove to be closely related.

A clear relationship, however, exists with the species described from South India, namely *A. tanjoricus* (Poc.), *A. splendidus* (Verh.) and *A. insignis* Att. According to POCOCK, *anthracinus* may be distinguished from *tanjoricus* "by its fuscous legs and sternal areas, much less prominent keels and deeper transverse tergal sulcus". *A. insignis* also appears to have more strongly developed lateral keels, and the process of the sternite of the 5th somite is described as a "broad, designated as lectotype and paratype respectively.

A. splendidus was brought into the synonymy of *anthracinus* by ATTEMS (1937), but the description by VERHOEFF is too short to judge the correctness of this action.

Anoplodesmus obesus Pocock

1895 *Anoplodesmus obesus* Pocock, Ann. Mus. civ. Stor. nat. Genova 34 : 800.
1895 *Anoplodesmus pinguis* ♂ Pocock, l.c.: 800, fig. 7—7a.
1937 *Anoplodesmus obesus* + *Anoplodesmus pinguis* ♂; Attems, Tierreich 68 : 105.

Material.

This species was based on an unrecorded number of specimens of both sexes from Meteleo. The Genoa Museum has a male and a female, which I have designated as holotype and paratype respectively.

Moreover, the male specimen from Puepoli which POCOCK referred to *A. pinguis* is not conspecific with the female lectotype of that species, but belongs to *obesus.*

Meteleo, Carin Cheba, coll. L. FEA, 1 ♂ lectotype, 1 ♂ paratype. Puepoli, Carin Cheba, coll. L. FEA, 1 ♂.

Description.

Colour. — See POCOCK.

Width. — ♂ : lectotype: 6.0 mm; paratype of *pinguis*: 5.7 mm. ♀ : 5.6 mm.

Head and antennae. — Antennal sockets separated by one and a half times the diameter of a socket, or by four fifths of the length of the 2nd antennomere. Postantennal groove wide and shallow, the wall in front weakly prominent. Pubescence of antennae moderate in the basal antennomeres to dense in the distal ones. Length of antennomeres: $2 = 3 = 4 > 5 > 6$; the 6th antennomere four fifths of the length of the 2nd.

Collum. — Distinctly wider than the head. The anterior border straight in the middle, laterally widely and almost evenly rounded towards the latero-posterior edge. Posterior border faintly emarginate or practically straight in the middle, widely convex laterally. A notch at the base of the lateral keels. Posterior border of keels faintly convex or straight. Latero-posterior edge of keels slightly obtuse-angled, very narrowly rounded. Surface of collum smooth and rather shiny in the middle, rugulose on the lateral keels.

Somites. — Constriction very weak. Prosomites rather shiny. Stricture narrow, sculpture as in *anthracinus.* Metatergites smooth and rather shiny, coriaceous on the lateral keels. Transverse furrow present from the 5th to the 18th somite, weak also in the 4th somite. Sides coriaceous and minutely granular. Pleural keels

represented by distinct ridges in the 2nd to 4th somites, produced caudally in a triangular lappet, which projects scarcely behind the posterior border only in the 2nd somite, not in the 3rd and 4th somites. The lappet is slightly acute-angled in the 2nd and 3rd somites, obtusely angular in the 4th. Pleural keels in the 5th and subsequent somites represented by a well developed, rounded swelling, dorsally demarcated by a furrow which caudally curves upward along the posterior margin. The furrow is present up to the 15th somite, and is faintly indicated in the 16th and 17th somites.

Lateral keels. — (fig. 15). The 2nd, 3rd, and 4th somites about as wide as the collum. Keels of the 2nd somite a little declined. The anterior border scarcely shouldered at the base, widely rounded, more strongly rounded towards the lateral side and shading off into the lateral border, which is straight. Anterior border practically transverse on the longitudinal axis of the body. Posterior border as in *anthracinus,* scarcely curved forwards basally. Latero-posterior edge obtuse-angled, narrowly rounded, projecting a little caudad of the posterior border of the somite. Keels of the 3rd somite with the anterior border widely rounded, directed obliquely caudad; no latero-anterior edge, but the latero-anterior border rather widely, obtusely rounded. Posterior border a little concave basally, laterally obtusely and rather widely rounded, without latero-posterior edge. Keels of the 4th somite similar to those of the 3rd, both are projecting a little behind the border of the somites. Keels of the 5th and subsequent somites slightly declined as in the preceding somites. Anterior borders not shouldered. The anterior borders widely to very widely rounded. Latero-posterior edges obtuse-angled up to the 16th somite, right-angled in the 17th, acute-angled and slightly projecting in the 18th and 19th somites. Marginal rim rather thick, in the poriferous keels widening in the area of the pore, becoming about two times as wide as the poreless keels.

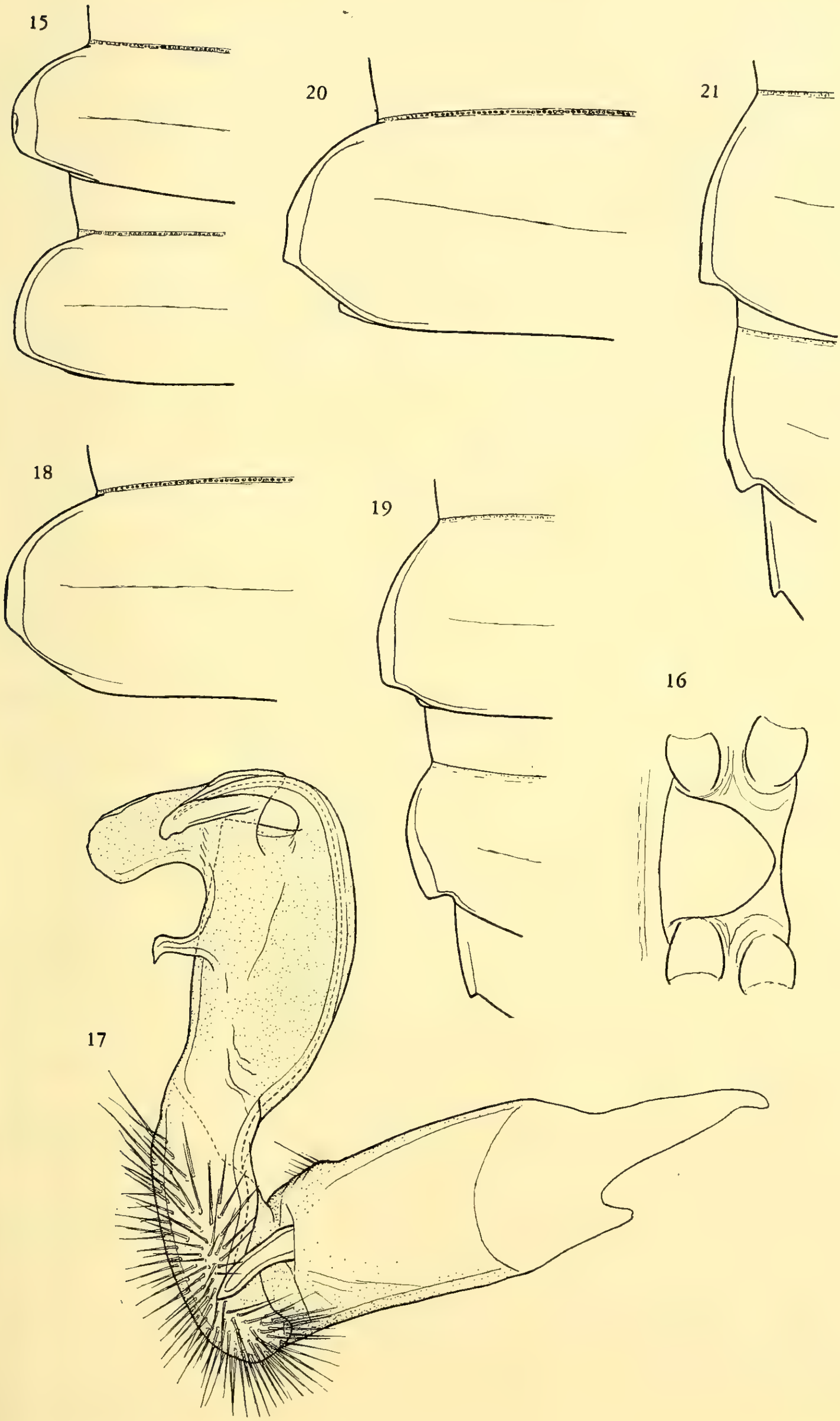
Sternites and legs. — Cross impressions of the sternites with the longitudinal furrow scarcely impressed, the transverse furrow distinct. Sternite of the 5th somite with a very thick process between the anterior legs (fig. 16), which curves caudad, covering also a part of the posterior half of the sternite. It has a sub-pentagonal shape. Posterior part of the sternite of the 5th somite somewhat concave. Sternite of the 6th somite without particulars between the anterior legs, the posterior part a little excavate. Sternite of the 7th somite with a weak transverse ridge laterad of the anterior margin. Sternite of the 8th somite without particulars. Legs rather long, moderately slender, somewhat incrassate in the anterior part of the body, but without modifications. Last legs not modified.

Anal somite. — Epiproct with the sides nearly parallel.

Gonopods. — (fig. 17). Coxal horn without slender projection. Prefemur a little less elongate than in *anthracinus.* Femur more strongly rounded, widening

---

Fig. 15—19. *Anoplodesmus obesus* Pocock. — 15: left side of the 10th and 11th somites, dorsal aspect, lectotype ♂. 16: sternite of the 5th somite, ventral aspect, lectotype ♂. 17: right gonopod, mesal aspect, lectotype ♂. 18: left side of the 10th somite, dorsal aspect, paratype ♀. 19: left side of the 17th, 18th and 19th somites, dorsal aspect, paratype ♀. Fig. 20—21. *Anoplodesmus pinguis* Pocock, lectotype ♀. — 20: left side of the 10th somite, dorsal aspect. 21: left side of the 17th, 18th and 19th somites, dorsal aspect


15
20
21
18
19
16
17

distad. Both parts of the tibiotarsus pointing meso-caudad, relatively larger than in *anthracinus*.

Female. — Differentiated from the male, aside from the usual sexual characters, as follows. Antennal sockets separated by about the length of the 2nd antennomere. Antennae relatively a little shorter. Body a little more robust, with the lateral keels somewhat less developed (fig. 18—19). The 2nd somite a little wider than the collum. The 3rd and 4th somites of about the same width as the 2nd. Sternites as long as wide. Legs relatively somewhat shorter, slightly more slender. Length of podomeres: $3 > 6 > 2 > 5 = 4$; the 6th podomere about half the length of the 3rd. Epiproct relatively shorter, the sides weakly convergent.

In the characters not mentioned *obesus* agrees with *anthracinus*.

Remarks.

After close comparison of the lectotype ♂ of *obesus* with the male specimen from Puepoli referred to *A. pinguis* by POCOCK, there remains no doubt whatever that these two specimens are conspecific. In fact, it is difficult to see why POCOCK referred the Puepoli specimen to *pinguis*, for the alleged differences in the shape of lateral keels are totally insignificant and do not correspond with the differences between the females of *obesus* and *pinguis*.

A. obesus belongs in a group with *A. pinguis* Poc., *A. striolatus* Poc., and *A. dyscheres* Att. It appears to come closest to *A. pinguis* of which, unfortunately, the male is still unknown. *A. striolatus* and *A. dyscheres* both differ from *obesus* in the shape of the lateral keels, which have the posterior border transverse on the axis of the body instead of running obliquely cephalad. Undoubtedly, more characters will be found when these two species are re-examined.

Anoplodesmus pinguis Pocock

1895 *Anoplodesmus pinguis* ♀ Pocock, Ann. Mus. civ. Stor. nat. Genova 34 : 800.
1937 *Anoplodesmus pinguis* ♀; Attems, Tierreich 68 : 105.

Material.

This species was based on two female specimens from Rangoon, one collected by OATES, one by FEA, and several immature specimens from Palon in Pegu collected by FEA.

The Genoa Museum has one female specimen from Rangoon, which I have designated as lectotype, and a single juvenile female from Palon, now labelled as paratype.

WEIDNER (1960) quotes a single paratype from Palon in the Hamburg Museum, obviously one of the juveniles mentioned by POCOCK. The specimen collected by OATES is probably located in the British Museum.

The male specimen from Puepoli certainly does not belong to *pinguis* as was suggested by POCOCK, but proves to be conspecific with *obesus*.

Description.

Colour. — See POCOCK.

Width. — ♀ : 6.4 mm; juvenile ♀ with 19 segments: 4.1 mm.

Head and antennae. — Antennal sockets separated by one and two fifths times the diameter of a socket or by seven eighths of the length of the 2nd antennomere.

Collum. — Lateral margin without distinct latero-posterior edge.

Lateral keels. — (fig. 20—21). The latero-anterior and latero-posterior edges of the keels of the 2nd somite slightly more widely rounded than in *obesus*. The latero-posterior edges of the keels in the second half of the body distinctly angular; the edges right-angled in the 17th somite, acutely angular in the 18th and 19th somites. All the lateral keels are smaller than in *obesus*.

Sternites. — In the middle somites the sternites are somewhat broader than long.

In the characters not mentioned, *pinguis* agrees with the paratype female of *obesus*.

In the juvenile female the keels are relatively somewhat more strongly developed than in the adult. As usually the reverse is the case, one may wonder if this juvenile does not belong to an other species.

Remarks.

As the male which POCOCK tentatively referred to this species does not belong to *pinguis* but to *obesus*, the male characters of *pinguis* are unknown. Yet, *pinguis* is undoubtedly closely related to *obesus*, and we may safely assume that the gonopods will prove to be largely similar to those of *obesus*, and that anyhow the differential characters are to be found mainly in the external morphology, particularly in the shape of the lateral keels.

Trogodesmus Pocock

1895 *Trogodesmus* Pocock, Ann. Mus. civ. Stor. nat. Genova 34 : 804.
1937 *Kronopolites* in part; Attems, Tierreich 68 : 49.
1963 *Attemsina* Hoffman, Ann. Mag. nat. Hist. (13) 5 : 585.

Type-species.

Trogodesmus: *Trogodesmus bicolor* Pocock, 1895, by subsequent designation by SILVESTRI, 1896 (Ann. Mus. civ. Stor. nat. Genova 36 : 197).

Attemsina: *Kronopolites uncinatus* Attems, 1936, by original designation.

Diagnosis.

When he established this genus, POCOCK characterized *Trogodesmus* in the following way: "Resembles *Strongylosoma* in the majority of its characters, but differs markedly in the unusual development of the two tubercles upon the anal sternite".

At the time, the name *Strongylosoma* embraced a vast and heterogeneous majority of the known Paradoxosomatidae of the world, and this, together with the nature of the used character, made the diagnosis quite unsatisfactory from the very beginning. Moreover, the three species of *Trogodesmus* were based on female specimens, and it is therefore no wonder that the genus was foredoomed to fall into oblivion.

While studying the type material of two species of *Trogodesmus* in the Genoa Museum, I realized that they presented a combination of characters which is quite singular in the family Paradoxosomatidae. After a confrontation of this material with the descriptions of the paradoxosomatids subsequently described from Burma and adjacent regions, it became evident that the two species of *Trogodesmus* were

extremely similar to *Kronopolites uncinatus* Attems from Assam, and *Kronopolites helvolus* Attems from Burma.

As a rule a generic identification without the aid of male characters is questionable in this family. However, it becomes less so when the general morphology of the species involved is sufficiently characteristic as in the present case, and the postulation is supported by a geographical argument. I feel, therefore, perfectly safe to refer *uncinatus* and *helvolus* to *Trogodesmus* and to supplement the generic diagnosis with the male characters of these two species.

20 somites; poreformula normal. Head without particulars. Antennae of moderate length. Collum somewhat wider than the head.

Somites moderately (♂) to weakly (♀) constricted; stricture narrow. Metatergites with a rather coarse leathery sculpture; a deep transverse furrow from the 4th or 5th somite onwards. Pleural keels weakly developed and present only up to the 4th somite, or absent (?).

Lateral keels rather weakly developed; those of the 2nd somite somewhat below the level of those of the 3rd. Posterior edges of keels projecting behind the margin of the somites in the 2nd somite only or in the 2nd and a few posterior somites. Margin of keels entire, without indentations.

Sternites in the middle part of the body about as long as wide (♂, ♀) or somewhat broader than long (♀); no sternal cones. Sternite of the 5th somite of the male without process. Legs of moderate length. Brushes on tarsi present or absent. First leg of male not modified.

Gonopod coxa moderately developed. Prefemur short, ovoid. Femur slender, elongate, straight. Spermal channel running straight along the mesal side of the femur. No postfemoral region demarcated. Solenomerite arising from the mesal side of the distal end of the femur. Tibiotarsus springing from the lateral side of the distal end of the femur, slender, straight in line with the axis of the femur. Solenomerite sheathed or at least supported by the tibiotarsus.

Remarks.

In the Genoa Museum I found only the type material of *Trogodesmus vittatus* Poc. and *T. nigrescens* Poc. The two type specimens of *T. bicolor* Poc. mentioned by POCOCK were sent out on loan to SILVESTRI many years ago; they may still be in the SILVESTRI collection at Portici.

Although I thus could not re-examine the type-species of *Trogodesmus*, the three species described by POCOCK appear to be so similar that their congenerity seems beyond doubt.

As was stated above, I consider two species previously referred to *Kronopolites* Att., viz., *K. uncinatus* Att. and *K. helvolus* Att. congeneric with the species of *Trogodesmus* on account of their external similarity. These two species have nothing to do with the type-species of *Kronopolites*, and actually were removed from that genus recently by HOFFMAN (1963). HOFFMAN quite correctly created a new genus, *Attemsina*, for the two, but unfortunately I have to bring this name into the synonymy of *Trogodesmus*.

The genus *Trogodesmus* thus consists of the following species:

Trogodesmus bicolor Pocock, 1895 (Ann. Mus. civ. Stor. nat. Genova 34 : 804, fig. 10—10a) — Burma.

Trogodesmus vittatus Pocock, 1895 — Burma.

Trogodesmus nigrescens Pocock, 1895 — Burma.

Trogodesmus uncinatus (Attems, 1936) (Mem. Ind. Mus. 11 : 230, fig. 47; 1937, Tierreich 68 : 55, fig. 68—69) — Assam.

Trogodesmus helvolus (Attems, 1936) (Mem. Ind. Mus. 11 : 231, fig. 48; 1937, Tierreich 68 : 56, fig. 70—71) — Burma.

Owing to the circumstance that the male characters are known only for two out of five species, the distinction between the species of *Trogodesmus* is almost impossible. Therefore, the following key perforce is very defective.

Key to the species of *Trogodesmus*

1. Width (♀) 6.0 mm. Dorsum with a broad, continuous and parallel-sided yellow stripe. Hypoproct with a convex posterior border; the elongate tubercles projecting considerably .... *T. bicolor* Poc.
— Width (♂ , ♀) 4.0 to 4.9 mm 2
2. Dorsum with a broad median yellowish band or series of spots 3
— Dorsum without yellow band or spots 4
3. A large yellow spot on the metatergites. Keels of the 17th somite right-angled, of the 18th and 19th somites acute-angled, not projecting behind the posterior margin (♀). Hypoproct with the posterior border obtuse-angled, rounded; tubercles mammiform, projecting behind the margin, but not reaching beyond the middle .... *T. vittatus* Poc.
— Dorsum with a continuous yellow band. Keels of the 16th and 17th somites right-angled, of the 18th and 19th acute-angled, scarcely projecting behind the margin (♂). Hypoproct rounded (tubercles ?) .... *T. helvolus* (Att.)
4. Dorsal surface a uniform chocolate brown. Keels of the 16th somite right-angled, of the 17th to 19th acute-angled, those of the 18th and 19th somites projecting a little behind the posterior border (♀). Hypoproct with the posterior border obtusely angular, rounded; the tubercles somewhat bifid, projecting behind the middle .... *T. nigrescens* Poc.
— Colour pale brown. Keels from the 13th to the 15th somite angular, those of the 16th to 19th a short blunt tooth (♂). Hypoproct with the posterior border straight, with two large tubercles .... *T. uncinatus* (Att.)

Trogodesmus vittatus Pocock

1895 *Trogodesmus vittatus* Pocock, Ann. Mus. civ. Stor. nat. Genova 34 : 806.

Material.

This species was based on a single female specimen which I studied in the Genoa Museum: Palon (Pega), coll. L. FEA, 1 ♀ holotype.

Description.

Colour. — See POCOCK.

Width. — 4.4 mm.

Head and antennae. — Labrum tridentate, the emargination deep and moderately wide. Clypeus moderately convex, rather strongly impressed towards the labrum; the lateral border straight, a distinct notch near the labrum. Headplate rugulose

in the clypeal part, otherwise smooth. Pubescence rather dense to moderate up to the lower part of the vertex. Vertex hairless. Antennal sockets separated by the diameter of a socket, or by a little more than two thirds of the length of the 2nd antennomere. Postantennal groove widely and rather deeply impressed; the wall in front moderately prominent. Vertex moderately convex, demarcated from the frontal region by a weak transverse depression. Vertigial sulcus well impressed, running downward to the upper level of the antennal sockets. Antennae of moderate length, moderately stout, distinctly clavate. Pubescence moderate in the proximal antennomeres to dense in the distal ones. Length of antennomeres: $2 = 3 > 4 > 5 = 6$; the 6th antennomere about four fifths of the length of the 2nd.

Collum. — (fig. 22). A little wider than the head, subtrapezoidal in dorsal outline. Anterior border straight in the middle, evenly rounded towards the lateral border. Posterior border widely emarginate in the middle, faintly convex laterally, and practically straight at the side. Lateral border rather widely and practically symmetrically rounded. Surface minutely rugulose-subgranulose, hairless. Marginal rim laterally very narrow and weakly defined. Collum transversely almost evenly convex, the lateral sides scarcely raised.

Somites. — Robust and weakly constricted. Prosomites dulled, somewhat silky. Stricture narrow, anteriorly sharply demarcated from the prosomite, dorsally finely but distinctly ribbed down to the level of the lateral keels, faintly striate below. Metatergites minutely but rather coarsely leathery rugulose, hairless. Transverse furrow well impressed, finely striolate, present in the 4th to 18th somites, weak also in the 19th. Sides minutely but densely granulate. Pleural keels of the 2nd and 3rd somites represented by well developed ridges, which are scarcely produced caudad. The posterior edge in the 3rd somite is about right-angled. In the 4th somite the pleural ridge is less defined and caudally rounded. From the 5th somite onwards the pleural keels are missing.

Lateral keels. — (fig. 22—24). 2nd, 3rd and 4th somites each slightly wider than the preceding somite. Keels of the 2nd somite with the anterior border faintly convex, slightly thrust forward. Latero-anterior edge slightly acute-angled. Lateral border widely convex. Latero-posterior border rather narrowly rounded, without distinct edge, projecting somewhat behind the margin of the somite. Marginal rim narrow, laterally weakly demarcated. Keels of the 3rd somite semi-elliptical in outline, anteriorly and posteriorly evenly rounded, without edges. Marginal rim thin as in the 2nd somite, but more distinctly demarcated. The lateral margin faintly undulate. Keels of the 4th somite similar to those of the 3rd, but the anterior border a little more widely rounded, and the keel a little broader caudally. Keels of the 5th and subsequent somites with the latero-anterior border becoming more and more widely rounded. Posterior edges weakly defined, very obtuse, except in the 17th somite, where right-angled, and in the 18th and 19th somites, where acutely angular. In none of these somites the edges project behind the margin of the somites. Poreless keels only dorsally demarcated, the poriferous keels also ventrally demarcated by a furrow in the posterior half. Pores lateral in a small ovoid excavation.

Sternites and legs. — Sternites in the middle part of the body as long as wide.

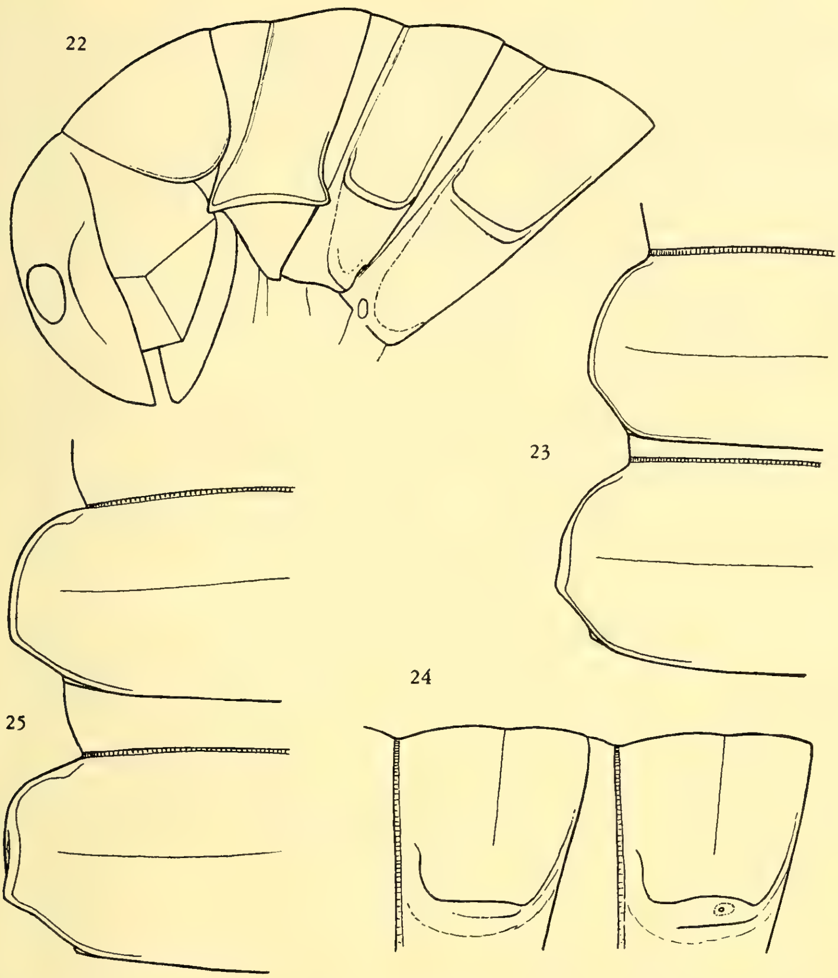


Fig. 22—24. *Trogodesmus vittatus* Pocock, holotype ♀. — 22: left side of head and four anterior somites, lateral aspect. 23: left side of the 11th and 12th somites, dorsal aspect. 24: left side of the 11th and 12th somites, lateral aspect. Fig. 25. *Trogodesmus nigrescens* Pocock, holotype ♀. — left side of the 11th and 12th somites, dorsal aspect

Cross impressions moderately developed; the transverse furrow distinct, deepest; the longitudinal furrow weaker. No sternal cones. Pubescence moderate to sparse. Legs of moderate length, moderately slender. Pubescence ventrally moderate, dorsally sparse becoming moderately dense in the tarsi only. Length of podomeres: $3 > 6 > 5 = 2 > 4$; the 6th podomere almost two thirds of the length of the 3rd.

Anal somite. — Epiproct of moderate size; the sides converging concavely, becoming parallel near the end. Basal setiferous tubercles distinct; preterminal setiferous tubercles also well developed. Epiproct produced into two well developed cones which are moderately widely separated and directed a little ventrad. Valves

somewhat rugulose. The marginal rims narrow but rather high. Setiferous tubercles large. Hypoproct triangular-subtrapezoidal; the sides practically straight, the posterior border with a very obtuse-angled rounded median edge. Setiferous tubercles very large, mammiform, protruding past the margin but not projecting beyond the middle of the posterior border.

Remarks.

Under the name of *Trogodesmus vittatus* Pocock the Genoa Museum has also three juvenile specimens from Palon. Obviously these are the juveniles POCOCK (l.c.: 805) referred to *T. bicolor* Pocock. The material consists of a 19-segmented ♂, width 2.7 mm, and two 19-segmented ♀, width 3.0 mm, and 3.1 mm. They lack a distinct longitudinal flavous band and their reference to one of the two mentioned species is purely arbitrary.

T. vittatus in colouring apparently suggests *T. helvolus* (Att.) from Lashio, Burma. But the middorsal band of yellowish colour is broken into a large spot on each metatergite, instead of being continuous as seems to be the case in *helvolus*. For the rest, ATTEMS's description of *helvolus* does not contain reliable characters for separating it from *vittatus*.

T. bicolor Poc. also has a yellow middorsal band which is continuous and parallel-sided. Moreover, *bicolor* is a larger species.

Trogodesmus nigrescens Pocock

1895 *Trogodesmus nigrescens* Pocock, Ann. Mus. civ. Stor. nat. Genova 34 : 806.

Material.

The single female specimen on which this species was based has been re-examined in the Genoa Museum: Carin Cheba, Bia Po, 400—900 m, coll. L. FEA, 1 ♀, holotype.

Description.

Colour. — See POCOCK.

Width. — 4.9 mm.

Head and antennae. — As in *vittatus*.

Collum. — In general as in *vittatus*, but the lateral marginal rim more distinct. The lateral lappets more raised than in *vittatus*, but still declined.

Somites. — Metatergites more shiny than in *vittatus*, similarly rugulose but coarsely so only on the upper surface of the lateral keels. Pleural keels as in *vittatus*, those of the 2nd and 3rd somites produced into a distinct right-angled lappet, not projecting caudad of the margin of the somite.

Lateral keels. — (fig. 25). Relatively a little more strongly developed than in *vittatus*. Keels of the 2nd somite with the latero-anterior edge distinctly toothed, and the posterior edge obtusely rounded. The marginal rim well demarcated. Keels of the 3rd somite with the anterior border thrust forward a little and with a weakly defined obtusely rounded posterior edge. Keels of the 4th somite anteriorly faintly shouldered at the base. Keels of the 5th to 8th somites anteriorly a little shouldered at the base. The posterior edge right-angled in the 16th somite, acute-angled from the 17th somite onwards. From the 16th somite onwards the edges are slightly

produced caudad, in the 18th and 19th somites they project very slightly beyond the posterior margin.

Sternites and legs. — Sternites of the middle somites almost one and one fifth times broader than long. Pubescence rather dense, in the anterior sternites dense. Pubescence of legs in general a little more strongly developed than in *vittatus*. Length of podomeres: $3 > 6 > 2 > 5 = 4$; the 6th podomere about half as long as the 3rd.

Anal somite. — Epiproct as in *vittatus*, but the terminal cones at least two times longer than in *vittatus*, and directed obliquely ventrad. Hypoproct as in *vittatus*, but the setiferous tubercles bifid, more elongate and projecting behind the middle.

Remarks.

This species differs from *bicolor, vittatus* and *helvolus* in the absence of a yellow median band. From *T. uncinatus* it seems to differ in the development of the lateral keels, in which the posterior edges appear to be more pronounced. Perhaps there is a difference in the hypoproct too, but the description of *uncinatus* is too vague for a satisfactory comparison.

The Oriental Paradoxosomatidae characterized by the presence of a femoral tubercle in the first pair of legs of the male

The next two genera, *Tetracentrosternus* Poc. and *Pocockina* gen. nov., belong to the group of Indo-Australian Paradoxosomatidae in which the femur of the first legs of the male has a ventral tubercle. This group includes all the known Australian Paradoxosomatidae, with the possible exception of *Mjoebergodesmus* Verhoeff, 1924. Furthermore, it has some genera in the Papuan region, viz., *Aschistodesmus* Pocock, 1898, *Dendrogonopus* Jeekel, 1964, and possibly *Haplochiropus* Attems, 1944, as well as the following genera in the Oriental region. Some of these genera have not yet been established, and the giving of names is deferred until actual examination of pertinent material.

Unnamed genus

"*Strongylosoma*" *montigena* Carl, 1935 (Rev. Suisse Zool. 42 : 330, fig. 9—14; Attems, 1937, Tierreich 68 : 255, fig. 317) — Sikkim.

Unnamed genus

"*Orthomorpha*" *hingstoni* Carl, 1935 (Rev. Suisse Zool. 42 : 326, fig. 1—6; Attems, 1937, Tierreich 68 : 230, fig. 289) — Tibet.

"*Orthomorpha*" *simulans* Carl, 1935 (Rev. Suisse Zool. 42 : 330, fig. 7—8; Attems, 1937, Tierreich 68 : 231) — Nepal, Tibet.

Delarthrum Attems, 1936 (Mem. Ind. Mus. 11 : 236)

Delarthrum obscurum Attems, 1936 (l.c. : 236, fig. 50, 1937, Tierreich 68: 246, fig. 307) — Northern Pakistan.

Pocockina gen. nov., cf. p. 134

Pocockina pilifera (Pocock, 1895) — Burma.

Yuennanina Attems, 1936 (Mem. Ind. Mus. 11 : 234)

Yuennanina ceratogaster Attems, 1936 (l.c.: 234, fig. 49 ; 1937, Tierreich 68 : 259, fig. 323—324) — Yunnan.

Tetracentrosternus Pocock, cf. p. 129

Tetracentrosternus subspinosus Pocock, 1895 — Burma.

Xiphidiogonus Carl, 1932 (Rev. Suisse Zool. 39 : 444)

Xiphidiogonus spinipleurus Carl, 1932 (l.c.: 444, fig. 31—34; ATTEMS, 1937, Tierreich 68 : 247, fig. 308) — Peninsular India.

Xiphidiogonus dravidus Carl, 1932 (l.c.: 447, fig. 35—39; ATTEMS, 1937, Tierreich 68 : 248, fig. 309) — Peninsular India.

Xiphidiogonus hendersoni Carl, 1932 (l.c. : 449, fig. 40—43; ATTEMS, 1937, Tierreich 68 : 248, fig. 310) — Peninsular India.

Unnamed genus

"*Polydrepanum*" *implicatum* Carl, 1941 (Rev. Suisse Zool. 48 : 371, fig. 23—25) — Peninsular India.

The taxonomic importance of the presence of a femoral tubercle in the first pair of legs of the male is difficult to evaluate in these eight genera.

In the Paradoxosomatidae of Australia and New Guinea the character largely correlates with the gonopod structure. Unfortunately this is not the case in the above eight genera. The presence of the femoral tubercle does not coincide with any particular structure of the gonopods.

Nevertheless, it seems justified to regard the character as an indication of a certain amount of relationship between the genera involved, even though it has no decisive value.

Two of the above mentioned genera, *Xiphidiogonus* and a genus to be erected for "*Polydrepanum*" *implicatum* Carl, have a femoral tubercle also in the 2nd pair of legs. By evidence of the gonopods and in view of the geographical coherence these two appear to be most closely related to a number of South Indian genera which have the modification only in the 2nd pair of legs, viz., *Polydrepanum* Carl, 1932, *Telodrepanum* Carl, 1932, and *Grammorhabdus* Carl, 1932, as well as *Gyrodrepanum* Carl, 1932, a genus which lacks femoral tubercles in both anterior pairs of legs.

Recently (1964) I removed "*Strongylosoma*" *montigena* Carl from the genus *Akamptogonus* Att., to which it had been referred by ATTEMS (1937). The species certainly represents a generic type which appears to stand quite isolated even among the group which has the femoral tubercle in the first leg of the male.

The genus to be proposed for "*Orthomorpha*" *hingstoni* Carl and "*O.*" *simulans* Carl is characterized by a peculiar small process arising from the lateral side of the gonopod femur. The two species were referred to the genus *Alogolykus* Attems, 1936, by ATTEMS (1937), but, as HOFFMAN (1963) pointed out, they have nothing to do with that genus. The two species may come nearest to *Delarthrum* Att., but the relationship is by no means obvious.

The remaining four genera will be discussed under the remarks on *Tetracentrosternus* and *Pocockina.*

Key to the paradoxosomatid genera of the Oriental region characterized by the presence of a ventral femoral tubercle in the first pair of legs of the male

1. Gonopods with an entirely free solenomerite, which is longer and stouter than the other processes of the acropodite, and is not acuminate towards the end. The 2nd pair of legs of the male without a femoral process. Legs of the 4th to 8th pairs with a basal swelling on the ventral side of the femur. Pleural keels absent .... Unnamed genus ("*Strongylosoma*" *montigena* Carl)
— Gonopods with a slender, acuminate solenomerite supported or sheathed by the tibiotarsus, and not exceeding the tibiotarsus in length 2
2. The 2nd pair of legs of the male without femoral process 3
— The 2nd pair of legs of the male with a femoral process similar to the one occurring on the first leg 7
3. Acropodite of the gonopods deeply split into several processes; the femoral part less than half the length of the acropodite 4
— Acropodite not deeply split; the femoral part exceeding half the length of the acropodite 5
4. Sternite of the 5th somite of the male with a long anterior and a short posterior process. Sternite of the 6th somite with a large process. Solenomerite of the gonopods with two accessory branches. Pleural keels absent ... *Yuennanina* Att.
— Sternite of the 5th somite of the male with only the usual anterior process. Sternite of 6th somite without process. Solenomerite without accessory branches. Pleural keels present in a number of anterior somites ... *Tetracentrosternus* Poc.
5. Prefemur of gonopods with a small finger-like process arising from the lateral side. Pleural keels absent ... Unnamed genus ("*Orthomorpha hingstoni* Carl, "*Orthomorpha simulans* Carl)
— Prefemur of gonopods without process. Pleural keels present 6
6. Tibiotarsus well demarcated from the femur of the gonopods, subarticulate. Gonopod femur with a small distal process .... *Delarthrum* Att.
— Tibiotarsus not sharply demarcated from the gonopod femur. The femur with a process exceeding half the length of the tibiotarsus ...... *Pocockina* nov. gen.
7. Acropodite of the gonopods split to the middle of the femur, from where arise a large and a small femoral process .... Unnamed genus ("*Polydrepanum*" *implicatum* Carl)
— Acropodite of the gonopods not deeply split. The femoral processes small ... . *Xiphidiogonus* Carl

Tetracentrosternus Pocock

1895 *Tetracentrosternus* Pocock, Ann. Mus. civ. Stor. nat. Genova 34 : 802.
1963 *Tetracentrosternus* ; Hoffman, Ann. Mag. nat. Hist. (13) 5 : 589.

Type-species.

Tetracentrosternus subspinosus Pocock, 1895, by monotypy.

Diagnosis.

20 somites; poreformula normal. Head without particulars. Antennae long, a little clavate. Collum a little narrower than the head, transversely furrowed.

Somites moderately constricted; the stricture of moderate width. Metatergites with a deep transverse furrow present from the 2nd somite onwards. Pleural keels present only in the somites of the anterior half of the body.

Lateral keels moderately developed, those of the 2nd somite below the level of those of the 3rd. Posterior edges of keels produced caudad only in a number of somites in the posterior half of the body. Lateral margin of keels without distinct indentations.

Sternites of the somites of the middle of the body about as long as wide in the male. Sternal cones present in most postgonopodial somites. Sternite of the 5th somite of the male with a well developed process between the anterior legs. Sternite of the 6th somite of the male somewhat modified. Legs rather long. Tibial and tarsal brushes present in most legs of the male. First leg of the male with a ventral femoral tubercle.

Gonopod coxa relatively small. Gonopod prefemur short and broad, laterally well demarcated from the acropodite. Femur completely reduced, the acropodite consisting of three main processes arising directly from the prefemur: a femoral process, a solenomerite and a tibiotarsus. Solenomerite and femoral process elongate and both partly sheathed by folds of the tibiotarsus. Laterad of these two prongs arises the tibiotarsus, which is folded complicatedly and ends in a reflexed lamina.

Remarks.

The type-species of *Tetracentrosternus* has been studied recently by HOFFMAN (1963), who gave a pair of gonopod drawings and discussed the relationship of the genus. Together with *Alogolykus* Attems, 1936, and *Touranella* Attems, 1937, *Tetracentrosternus* was brought into a new tribe Alogolykini, which was characterized mainly by the shortened gonopod femur, the presence of a femoral process in the gonopods, and the absence of a femoral tubercle in the first pair of legs of the male.

As regards the non-gonopod characters of *Tetracentrosternus*, HOFFMAN relied on the description of POCOCK, and consequently overlooked the presence of a femoral tubercle in the first leg of the male of *T. subspinosus*. This does not, however, affect HOFFMAN's discussion of the relationship of *Tetracentrosternus* with *Alogolykus*, since this is mainly based on the undeniable agreement in the gonopod structure. On the other hand, the presence of the femoral tubercle seems to indicate that *Tetracentrosternus* is also related to *Yuennanina* Att., a genus also characterized by an abbreviate gonopod femur, but lacking an elongate femoral process in the gonopods.

Tetracentrosternus subspinosus Pocock

1895 *Tetracentrosternus subspinosus* Pocock, Ann. Mus. civ. Stor. nat. Genova 34 : 803, fig. 9—9a.

1963 *Tetracentrosternus subspinosus* ; Hoffman, Ann. Mag. nat. Hist. (13) 5 : 591, fig. 9—10.

Material.

This species was originally described after material from Puepoli and Bia Po; the number of specimens was not recorded. Judging from the arrangement of the

description it seems that POCOCK had only male specimens of this species.

In the British Museum there is only one male from Puepoli which has been recently selected as lectotype by HOFFMAN. In the Genoa Museum I found a single male from Bia Po which I have labelled as paratype and on which the following description has been based. In the loan register of the Genoa Museum I found the evidence that one specimen from Puepoli was sent out to SILVESTRI in 1902. This specimen is probably still in the SILVESTRI collection at Portici.

Carin Cheba, Bia Po, 1000—1200 m, coll. L. FEA, 1 ♂ paratype.

Description.

Colour. — See POCOCK.

Width. — 2.0 mm.

Head and antennae. — Labrum deeply and rather widely emarginate, tridentate. Clypeus moderately convex, moderately impressed towards the labrum; the lateral border widely emarginate. Headplate smooth (?); pubescence moderate up to the lower half of the vertex. Antennal sockets separated by one and one third times the diameter of a socket or by three fifths of the length of the 2nd antennomere. Postantennal groove wide, rather deep; the wall in front rather prominent. Vertex weakly convex. The sulcus well impressed, not reaching the upper level of the antennal sockets. Vertex demarcated from the frontal region by a weak depression. Antennae long and rather stout, a little clavate. Pubescence moderate proximally to dense distally. Length of antennomeres: $3 > 4 > 5 > 2 > 6$; the 6th antennomere over three quarters of the length of the 2nd, and over three fifths of the length of the 3rd.

Collum. — A little narrower than the head, subsemicircular in dorsal outline. Anterior border evenly widely rounded, slightly more narrowly rounded laterally. Posterior border faintly concave, widely rounded laterally. Sides widely and a little asymmetrically rounded, the rounding narrowing caudad. Surface shiny, smooth; a deep transverse furrow; some dispersed hairs. Marginal rim laterally narrow but well raised, anteriorly practically obsolete. Convexity of collum weak in the middle, much stronger towards the lateral sides.

Somites. — Prosomites dulled by a fine cellular structure, distinctly marked off from the stricture. Stricture finely ribbed dorsally down to the level of the lateral keels, below that level with some transverse striae. Metatergites shiny, smooth or with some irregular wrinkles. Transverse furrow widely and deeply impressed, finely but distinctly striate, present from the 2nd to the 18th somite, weak also on the 19th. A weak longitudinal median furrow may be visible sometimes. Sides smooth, only in the anterior somites with a few dispersed granules in the lower part. Pleural keels represented by a distinct ridge in the 2nd somite. In the 3rd and 4th somites a rounded lappet projecting outward, in the 4th somite produced caudad a little but not projecting behind the margin of the somite. In the 5th, 6th and 7th somites a lappet projecting outward only above the posterior legs, particularly developed in the 6th somite.

Lateral keels. — (fig. 26—27). 2nd somite a little wider than the collum; 3rd somite narrower than the 2nd; the 4th wider than the 2nd. Keels of the 2nd somite below the level of those of the 3rd somite, sloping a little in a ventro-cephalad direction. Anterior border moderately widely rounded, shouldered a little at the

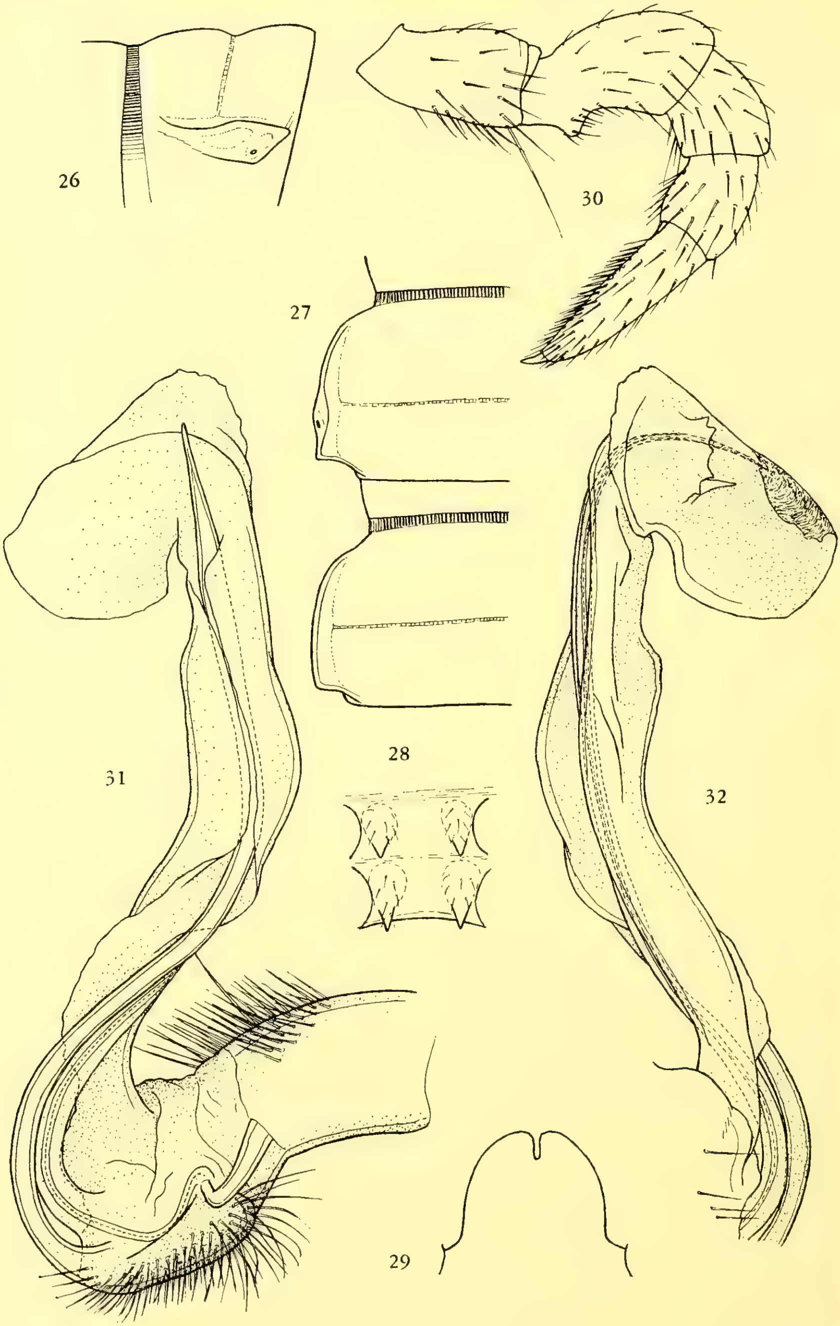


Fig. 26—32. *Tetracentrosternus subspinosus* Pocock, paratype ♂. — 26: left side of the 10th somite, lateral aspect. 27: left side of the 10th and 11th somites, dorsal aspect. 28: sternite of the 16th somite, ventral aspect. 29: sternal process of the 5th somite, caudo-ventral aspect. 30: telopodite of the first leg. 31: right gonopod, mesal aspect. 32: right gonopod, lateral aspect

base. Latero-anterior edge obtusely angular, produced into a small tooth. Lateral border widely rounded, faintly undulate. Posterior border narrow, practically straight. Latero-posterior edge obtuse-angled, produced and projecting very slightly behind the posterior border of the somite. Marginal rim narrow. Keels of the 3rd and 4th somites anteriorly and laterally moderately to widely rounded, with indications of two teeth; the rounding in the 4th somite a little wider. Posterior edges obtuse, narrowly rounded, not produced caudad. Posterior borders faintly convex. Marginal rims narrow. Keels of the 5th and subsequent somites with the anterior and lateral borders widely rounded, without notches. Posterior edges obtusely angular up to the 11th somite, right-angled in the 12th, becoming more acutely angular from the 13th somite onward. From the 13th somite onward the edges are produced a little, the 15th to 19th somites and particular the 17th somite having a small triangular posterior lappet. Only in the 18th and 19th somites the edges project a little behind the posterior margin of the somites. Poriferous keels with the pores in an oblique elliptical excavation. In front of the poriferous excavation a similar more elongate excavation; the two being separated by an oblique ridge. Poreless keels narrow dorso-ventrally, without particulars.

Sternites and legs. — Middle sternites about as long as wide. Cross impressions with the transverse furrow moderately impressed, the longitudinal furrow practically absent; the sternites conspicuously little raised above the level of the ventral side of the somite. Near the coxae a setiferous knob, low in the 8th somite, more strongly developed in the 9th, becoming conical in the 10th and subsequent somites. From the 11th somite onwards the posterior cones are directed backwards, from the 12th somite onwards the anterior cones also. In the subsequent somites the sternal cones become stronger and sharply pointed (fig. 28). In the 18th somite the cones are totally absent. Coxal bases in the 4th somite conspicuously widely separated. Sternite of the 5th somite with a broad, almost semicircular process between the anterior legs, directed a little cephalad. Distal end medially with a narrow, rather deep incision, the anterior side with short setae near the distal end but without brush (fig. 29). Prosomite of the 5th somite a little swollen in front of the process. Transverse furrow weak. Posterior portion of the sternite scarcely raised above the ventral level of the metasomite; pubescence reduced to a pair of tufts. Sternite of the 6th somite deeply excavated, not raised above the ventral surface of the metasomite; pubescence reduced to four tufts of setae. Sternite of the 7th somite without particulars. Legs rather long and moderately slender; the prefemora a little incrassate. Legs of the first pair a little incrassate, with a ventral femoral tubercle (fig. 30). 2nd pair of legs missing in specimen studied. Ventral pubescence of legs rather dense, dense in the prefemora; dorsal pubescence sparse to moderately dense, rather dense in tarsi only. Dense tarsal and distal tibial brushes present in most legs, thinning out in the last third part of the body and absent in the last two pairs. Length of podomeres: $3 > 6 > 5 = 2 > 4$; the 6th podomere seven tenths of the length of the 3rd.

Anal somite. — Epiproct rather broad, rather short, moderately thick. Sides converging a little concavely. Preterminal setiferous tubercles small. The end truncate, slightly emarginate, without distinct terminal knobs (tail damaged a little by the pin running through the body). Valves rugulose, the rims of moderate

width and height; setae not on tubercles. Hypoproct trapezoidal, the sides a little emarginate, the posterior border rounded. No distinct setiferous tubercles.

Gonopods. — (fig. 31—32). Coxa curving a little caudad, with a rather densely setiferous area on the anterior side. Prefemur directed distad, the demarcation between prefemur and acropodite parallel to the longitudinal axis of the latter. Femoral process arising mesad of the base of the solenomerite, curving into the same direction as the tibiotarsus, the distal portion largely sheathed by two folds of the tibiotarsus. The process is a slender style which is finely acuminate towards the end; it remains on the mesal side of the tibiotarsus throughout. Solenomerite also curving in the same direction as the tibiotarsus, the distal part also largely sheathed by folds of the tibiotarsus. The solenomerite is also a slender style, but it runs along the latero-anterior side of the tibiotarsus and bends finally towards the caudal side. Structure of the tibiotarsus very complicated, for the details see the drawings.

Pocockina gen. nov.

Type-species.

Orthomorpha pilifera Pocock, 1895.

Diagnosis.

20 somites; poreformula normal. Head without particulars. Antennae strongly clavate. Collum about as wide as the head.

Somites rather strongly constricted; the stricture rather broad. Metatergites with a deep transverse furrow, present from the 4th somite onwards. Pleural keels weakly developed, present in a few anterior somites only.

Lateral keels well developed, those of the 2nd somite below the level of those of the 3rd. Posterior edges of keels produced caudad and projecting behind the posterior margin in all somites. Lateral margin of keels with two indentations.

Sternites in the middle part of the body slightly longer than wide in the male, broader than long in the female. No sternal cones. Sternite of the 5th somite of the male with a well developed process between the anterior legs. Sternites of the 6th and 8th somites of the male somewhat modified. Legs rather long. Tibial and tarsal brushes present in most legs of the male. First leg of male with a ventral femoral tubercle.

Gonopod coxa well developed. Gonopod prefemur short, ovoid, laterally well demarcated from the femur. Femur slender, elongate. Spermal channel running straight along the medial side of the femur. Distally the femur curves abruptly laterad, and gives rise to a simple, leaf-like femoral process, the solenomerite and the tibiotarsus. Femoral process arising cephalad of the course of the spermal channel. Solenomerite flagelliform, in its natural position probably almost entirely sheathed by the lamellae of the tibiotarsus. Tibiotarsus consisting of a large concave blade, with concavity mesad, subsemicircular in outline, complicated by thin, serrulate lamellae.

Remarks.

When describing *Orthomorpha pilifera*, POCOCK compared this species with *Orthomorpha coarctata* (Sauss.), which, of course, was quite incorrect.

Like *Tetracentrosternus*, the species belongs to the group of South East Asian paradoxosomatids in which the males have a femoral tubercle in the first pair of legs. It comes nearest to *Delarthrum obscurum* Attems, 1936, from the Abottabad district in the North of West Pakistan, but seems sufficiently distinct to warrant a generic separation.

The differences between *Delarthrum* Att. and *Pocockina* mainly concern the distal part of the gonopod telopodite. In *Delarthrum* there is a small femoral process arising near the end of the femur on the medial side, cephalad of the course of the spermal channel. This small femoral process in *Delarthrum*, in *Pocockina* apparently is represented by the leaf-like lamella, which, however, arises here just distad of the bend of the femur. In *Delarthrum* the tibiotarsus is sharply demarcated from the femoral section of the gonopod, whereas in *Pocockina* there is no such sharp demarcation. In *Delarthrum,* moreover, the solenomerite arises straight from the distal end of the femur, without the spermal channel first making an abrupt bend in the lateral direction as in *Pocockina.* The structure of the tibiotarsus in *Pocockina* also appears widely different from that in *Delarthrum.*

As to how far external morphology of *Delarthrum* and *Pocockina* presents differences of generic importance is difficult to say at present.

The new genus is named in memory of R. I. POCOCK.

Pocockina pilifera (Pocock)

1895 *Orthomorpha pilifera* Pocock, Ann. Mus. civ. Stor. nat. Genova 34 : 809, fig. 11—11a.

Material.

This species was based on material from Rangoon collected by OATES, and from Palon in Pegu collected by FEA. The number of specimens has not been recorded. The British Museum has 1 ♂ and 1 ♀ from Rangoon, of which the first should eventually be designated as lectotype. WIEDNER (1960) quotes one paratype from Palon in the Hamburg Museum.

In the Genoa Museum I examined 1 ♂ and 1 ♀ from Palon, which I have labelled as paratypes and on which the following description is based.

Description.

Colour. — See POCOCK.

Width. — ♂ : 1.8 mm; ♀ : 2.1 mm.

Head and antennae. — Labrum widely and rather deeply emarginate, tridentate. Clypeus moderately convex, moderately impressed towards the labrum; the lateral border straight, widely emarginate near the labrum. Headplate smooth, shiny, moderately setiferous up to between the antennal sockets, the vertex hairless(?). Antennal sockets separated by one and one third times the diameter of a socket or by amply four fifths of the length of the 2nd antennomere. Postantennal groove wide, moderately deep; the wall in front moderately prominent. Vertex weakly convex; the sulcus rather weakly impressed, not reaching the upper level of the antennal sockets. Antennae of moderate length, moderately stout. Pubescence moderate in the proximal antennomeres to dense in the distal ones. Length of antennomeres:

$2 > 3 > 4 > 5 = 6$; the 6th antennomere three quarters of the length of the 2nd; width of the 6th antennomere equal to five sixths of its length.

Collum. — Subtrapezoidal in dorsal outline; about as wide as the head. Anterior border widely rounded in the middle, a little more narrowly rounded towards the lateral sides and practically straight laterally. Posterior border widely and weakly emarginate, laterally faintly convex. Lateral border widely rounded towards a narrowly rounded posterior lappet which is slightly produced caudad. Surface smooth, shiny; three transverse rows of hairs: one along the anterior margin, one in the middle and one near the posterior margin. Marginal rim of the sides narrow, caudally weakly defined. Convexity of collum weak in the middle, much stronger towards the sides, the lateral sides scarcely raised.

Somites. — Prosomites very dull, but not silky. Stricture distinctly ribbed dorsally to low down the sides. Transverse furrow of metatergites very deeply and widely impressed, coarsely ribbed, present from the 4th to the 18th somite. A weakly impressed median furrow behind the transverse furrow, and generally a weak longitudinal furrow in front of the transverse furrow. A transverse row of four setae behind the stricture and a similar row of generally eight setae near the posterior margin; the hairs of moderate length. Sides coarsely granulate in the anterior somites, coarsely granulate in the lower half only and smooth in the upper half in the subsequent somites. Pleural keels weakly developed. 2nd somite with a coarse ridge produced downward. In the 3rd somite a rather weak ridge, not produced caudad. In the 4th somite a similar, but weaker ridge. 5th and subsequent somites without pleural keels, but with a ridge along the posterior margin from the lateral keels downward curving a little cephalad above the posterior leg. Above the anterior leg a swelling. The ridges and swellings remain visible up to the 17th somite.

Lateral keels. — (fig. 33—34). 2nd, 3rd and 4th somites each slightly wider than the preceding somites. Keels of the 2nd somite somewhat declined. Anterior border widely rounded, a little shouldered at the base. Latero-anterior edge about right-angled, produced laterally into a tooth. Lateral border widely rounded, with two indentations. Posterior border practically straight. Latero-posterior edge slightly acute-angled, not pointed, produced caudad and projecting distinctly behind the posterior margin of the somite. Margin of keels thin, the rim rather distinctly defined. Keels of the 3rd and 4th somites subsimilar. Anterior border widely rounded, lateral border almost straight, with two indentations. Posterior edges very acute-angled, pointed and strongly produced caudad, and projecting behind the margin. Marginal rims moderately thick. Keels of the 5th and subsequent somites with the anterior border rather widely rounded and the lateral border almost straight and with two indentations. The posterior edges acutely angular, in the middle somites somewhat less acute than in the anterior and posterior somites. Pores in an elliptical excavation, and situated just above the second lateral tooth.

Sternites and legs. — Sternites of middle somites one and one eighth longer than broad. Cross impressions with the transverse furrow deepest. Pubescence moderate to rather sparse. Sternite of the 5th somite with a quadrate process between the anterior legs, which is more than one half as wide as the distance between the coxae. The end of the process rather abruptly and strongly curved cephalad,

weakly and widely incised in the middle. Before the end a brush of short hairs in the anterior concavity. Transverse furrow behind the process well impressed. Posterior portion of the sternite triangularly emarginate-excavate. Sternite of the 6th somite deeply excavate, not raised above the level of the ventral side of the metasomite except near the coxal bases. Pubescence reduced to four tufts of setae. Sternite of the 7th somite with a weak ridge latero-cephalad of the gonopod opening. Sternite of the 8th somite somewhat excavate, without distinct longitudinal furrow and with a weak transverse furrow. Legs rather long, moderately stout. The prefemora somewhat incrassate. Anterior legs incrassate, the femur

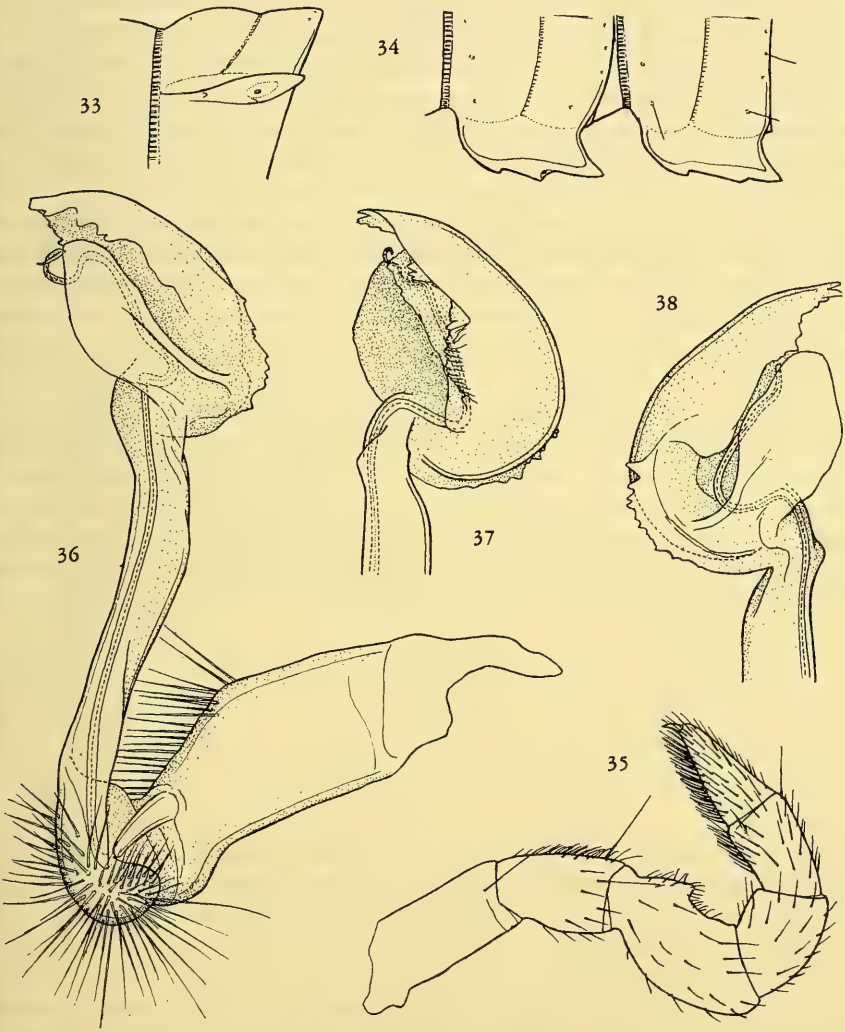


Fig. 33—38. *Pocockina pilifera* (Pocock), paratype ♂. — 33: left side of the 10th somite, lateral aspect. 34: left side of the 10th and 11th somites, dorsal aspect. 35: first leg. 36: right gonopod, mesal aspect. 37: left gonopod apex, anterior aspect. 38: the same, posterior aspect

of the 1st leg with a ventral tubercle (fig. 35). Legs of the 17th, and especially of the 18th somite slightly shortened, and with in particular the 4th and 5th podomeres incrassate. Dorsal pubescence of legs moderate, rather dense only in the tarsi. Ventral pubescence moderate, but dense in the prefemora and rather dense in the femora. Tarsal and distal tibial brushes very dense in the anterior legs, gradually thinning out in the subsequent legs and almost absent in the legs of the 17th somite. No brushes in the legs of the 18th somite. Length of podomeres: $3 > 6 > 5 = 2 > 4$; the 6th podomere nine tenths of the length of the 3rd.

Anal somite. — Epiproct broad, moderately long, the ventral side a little concave. Sides converging concavely, parallel near the end. Preterminal lateral setiferous tubercles small, the other setiferous tubercles also rather inconspicuous. End of epiproct broad, with a pair of rather narrowly separated, large, low, rounded terminal knobs. Valves rugulose; the marginal rims narrow and rather high. Setiferous tubercles weakly developed. Hypoproct triangular-subtrapezoidal. The sides a little concave, the posterior border rounded. Setiferous tubercles minute, not produced.

Gonopods. — (fig. 36—38). Coxa distinctly bent caudad in the distal half, anteriorly setose. Demarcation between prefemur and femur almost transverse on the longitudinal axis of the femur. Tibiotarsus very complicated, the concave lamella with several serrulate laminae. Owing to dirt attached to the concave lamella it was not possible to determine the exact structure of this lamella and the true position and base of the solenomerite.

Female. — Aside from the usual sexual characters differing from the male by the following characters. Antennal sockets separated by slightly more than the diameter of a socket or by three quarters of the length of the 2nd antennomere. Antennae relatively shorter. Pleural keels as in the male, but those of the 4th somite almost absent. Sternites of middle somites one and one quarter times broader than long. Legs relatively shorter and more slender. The last four pairs shortened as in the male. Length of podomeres: $3 > 6 > 2 > 5 = 4$.

"Orthomorpha" coxisternis Pocock

1895 *Orthomorpha coxisternis* Pocock, Ann. Mus. civ. Stor. nat. Genova 34 : 811, fig. 12.

Material.

This species was based on a single female specimen which has been re-examined in the Genoa Museum: Bhamo, coll. L. FEA, 1 ♀ holotype.

Description.

Colour. — See POCOCK.

Width. — 2.9 mm.

Head and antennae. — Labrum tridentate; the emargination rather deep and moderately wide. Clypeus moderately convex, moderately impressed towards the labrum; the lateral border widely convex, distinctly emarginate near the labrum. Headplate rugulose to smooth, shiny; pubescence rather dense to moderate up to the lower part of the vertex, middle of vertex with a pair of hairs. Antennal

sockets separated by slightly more than the diameter of a socket or by three quarters of the length of the 2nd antennomere. Postantennal groove rather deep and wide; the wall in front moderately prominent. Vertex rather convex; the sulcus moderately impressed, running downward to between the antennal sockets. Antennae of moderate length, moderately stout, scarcely clavate. Pubescence moderate proximally to rather dense distally. Length of antennomeres: $2 = 3 > 4 > 5 > 6$; the 6th antennomere only one seventh shorter than the 2nd.

Collum. — (fig. 39). A little wider than the head, subsemicircular in dorsal outline. Anterior border widely rounded, slightly more strongly rounded towards the sides. Posterior border weakly and widely emarginate, a little convex towards the lateral sides and a little concave again above the lateral rounding. Lateral border slightly asymmetrically rounded. Surface shiny, polished, hairless. The marginal rim narrow laterally, fading away towards the middle of the anterior border. Surface transversely almost evenly convex, scarcely flattened in the middle.

Somites. — Moderately constricted. Prosomites silky, distinctly demarcated from the stricture. Stricture of moderate width, the posterior part finely ribbed down to the level of the lateral keels, finely striate below that level. Metatergites shiny, smooth. Transverse furrow deep and rather wide, finely striate, present from the 5th to the 18th somite, weak also on the 4th. A short median impression immediately caudad of the stricture. In some somites there is a transverse row of four

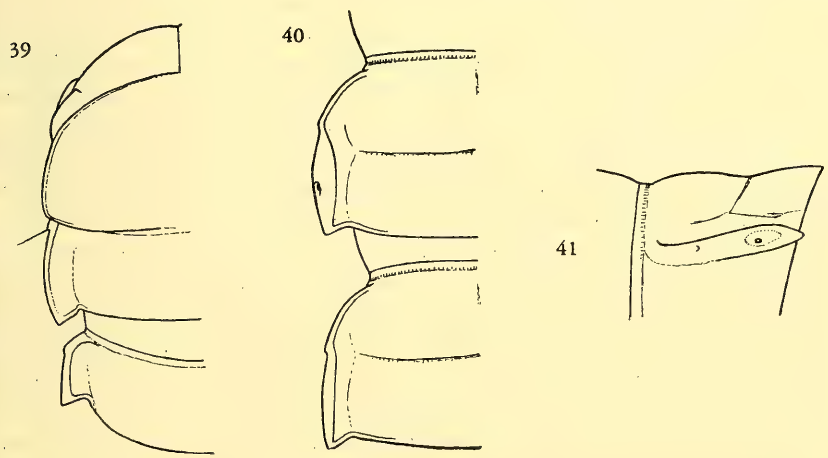


Fig. 39—41. "*Orthomorpha*" *coxisternis* Pocock, holotype ♀. — 39: left side of the head and three anterior somites, dorsal aspect. 40: left side of the 10th and 11th somites, dorsal aspect. 41: left side of the 10th somite, lateral aspect

minute granules in front of the transverse furrow. Sides finely granulate. Pleural keels in the 2nd, 3rd and 4th somites represented by strong ridges, which are caudally produced into an obtusely angular lappet. In the 3rd somite the lappet projects a little behind the margin of the somite, in the 4th it just reaches that margin. 5th somite with an obtusely angular lappet near the caudal margin, not

produced posteriorly. Towards the 10th somite this lappet gradually disappears.

Lateral keels. — (fig. 39—41). 2nd somite a little wider than the collum; the 3rd a little narrower than the 2nd, and about equal to the 4th. Keels of the 2nd somite below the level of those of the 3rd, declined. Anterior border slightly thrust forward, faintly convex. Latero-anterior angle obtuse. Lateral border widely rounded, anteriorly with a weak notch bearing a hair. Posterior border practically straight, slightly notched at the base. Latero-posterior edge about right-angled, projecting distinctly caudad of the margin of the somite. Marginal rim of moderate width, weakly demarcated posteriorly. Keels of the 3rd and 4th somites rather widely to widely rounded, each with a distinct latero-anterior tooth, dorso-ventrally thicker than the keels of the 2nd somite. Posterior edges slightly acutely angular, projecting a little behind the border of the somite, though scarcely in the 4th somite. Keels of the 5th and subsequent somites widely rounded, with a distinct latero-anterior notch. Posterior edge right-angled in the 5th somite, acutely angular from the 6th onwards, projecting a little caudad of the margin of the somite. In the 15th, and particularly in the 16th to 19th somites the posterior edge becomes more sharply pointed, though not conspicuously spiniform. Poriferous keels having the marginal rim distinctly widening caudad of the latero-anterior notch. Pores latero-dorsal in a slight ovoid concavity. At least in the posterior half of the keels the marginal rim is also ventrally demarcated by a furrow.

Sternites and legs. — Middle sternites only slightly longer than broad. Cross impressions distinct, well impressed; both furrows of equal depth. No sternal cones. Pubescence moderate. Legs rather long, moderately slender. Pubescence of the four basal podomeres ventrally moderate, dorsally sparse to practically absent; only the tibiae and tarsi rather densely setiferous all around. Length of podomeres: $3 > 6 > 5 = 2 > 4$; the 6th podomere seven eighths of the length of the 3rd.

Anal somite. — Epiproct of moderate length and width. The sides converging concavely, almost parallel near the end. Basal setiferous tubercles distinct; distal setiferous tubercles rather distinct, situated close to the end. The end with a pair of rather short, thick, bluntly rounded knobs which are separated by a narrow concavity. Ventral side of epiproct a little concave. Valves somewhat rugulose. Setiferous tubercles large and flat; the rims narrow and moderately high. Hypoproct broad: an obtusely angular triangle with widely rounded sides. Setiferous tubercles projecting slightly behind the margin, but not equalling the middle.

Remarks.

POCOCK (l.c.: 807) already noted the isolated position of this species within the genus *Orthomorpha* Bollman, 1893, and I can only confirm his opinion. "*O.*" *coxisternis* certainly does not belong to *Orthomorpha* in the current conception of that genus. Neither could I associate it generically with any of the other Burmese paradoxosomatids.

As such, the species has no outstanding characters. Nevertheless it presents a combination of characters which suggests a relationship with the genera *Tetracentrosternus* Poc. and *Pocockina* g. n. Possibly it will ultimately prove to belong to a not yet recognized generic type belonging to the group of Southeast Asian Paradoxosomatidae in which the femora of the first pair of legs of the males are provided with a ventral tubercle.

"Orthomorpha" bisulcata Pocock

1895 *Orthomorpha bisulcata* Pocock, Ann. Mus. civ. Stor. nat. Genova 34 : 808.
Not:
1903 *Orthomorpha bisulcata*; Attems, Zool. Jahrb. (Syst.) 18 : 64.

Material.

This species was based on two female specimens which are both in the Genoa Museum. Obviously the specimen from Rangoon was regarded as the type by POCOCK; consequently I have designated this as lectotype. The specimen from Meteleo I have labelled as paratype.

Rangoon, coll. L. FEA, 1 ♀ lectotype; Carin Cheba, Meteleo, coll. L. FEA, 1 ♀ paratype.

Description.

Colour. — See POCOCK.

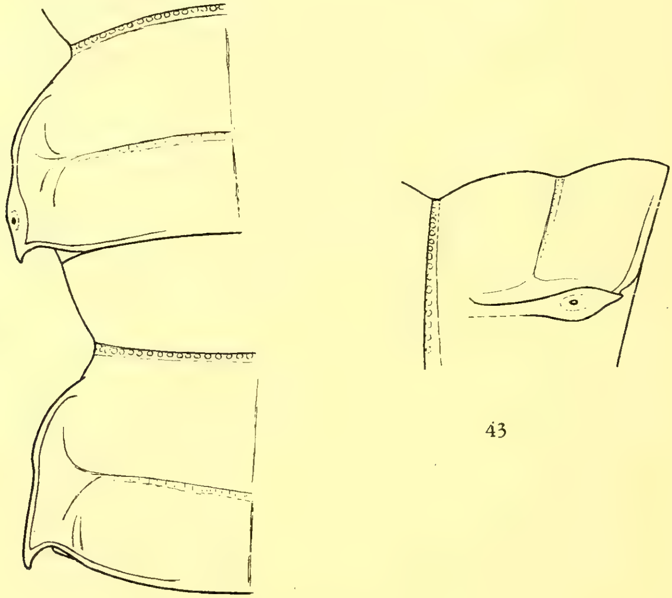
Width. — Lectotype ♀ : 2.5 mm; paratype ♀ : 2.4 mm.

Head and antennae. — Labrum widely and rather deeply emarginate, tridentate. Clypeus moderately convex, strongly impressed towards the labrum; the lateral border widely emarginate. Headplate shiny, rather densely to moderately setiferous up to the lower half of the vertex; middle of vertex with two hairs. Antennal sockets separated by one and a half times the diameter of a socket, or by almost half the length of the 2nd antennomere. Postantennal groove deep and rather wide; the wall in front rather prominent. Vertex rather convex; the sulcus well impressed, not reaching the upper level of the sockets. Antennae rather long, moderately slender, moderately clavate. Pubescence moderate in the proximal antennomeres to rather dense in the distal ones. Length of antennomeres: $3 > 4 = 2 > 5 > 6$; the 6th antennomere two thirds of the length of the 2nd.

Collum. — Reniform in dorsal outline; narrower than the head. Anterior border widely rounded, a little more strongly so towards the lateral sides. Posterior border widely emarginate, laterally faintly convex. Lateral border asymmetrically rounded, the latero-posterior edge obtuse and narrowly rounded. Surface shiny, smooth; a few dispersed hairs. A weak transverse furrow is present. Marginal rim very narrow laterally, practically absent anteriorly. Transverse convexity of collum weak in the middle, much stronger towards the sides.

Somites. — Rather strongly constricted. The prosomites somewhat dulled by a fine cellular structure. Stricture of moderate width, distinctly demarcated from the prosomites, coarsely beaded dorsally down to about halfway the lateral sides becoming indistinctly striate below. Metatergites more shiny than the prosomites. Transverse furrow deep and wide, finely and indistinctly striolate, present from the 2nd to the 19th segment. A rather deep median furrow behind the transverse furrow, and a similar but weaker furrow in front of the transverse furrow. A few anterior metatergites with some dispersed hairs. Sides up to the 6th or 7th somite very coarsely granulate-tuberculate in the lower half, and up to the 12th or 13th somite with a few dispersed minute granules, otherwise smooth. Pleural keels present only in the 2nd, 3rd and 4th somites. In the 2nd and 3rd somites they are ending caudally in a distinct triangular lappet projecting ventrad. In the 4th somite only a tuberculate ridge.

Lateral keels. — 2nd somite a little wider than the collum; 3rd somite a little narrower than the 2nd, and equal to the 4th. Keels of the 2nd somite below the level of those of the 3rd, strongly declined, almost vertical. The anterior border widely rounded; at the latero-anterior edge a strong tooth projecting downwards. Lateral border widely rounded, a little undulate. Posterior border narrow, straight. Latero-posterior edge obtusely angular, weakly produced caudad and scarcely projecting beyond the margin of the somite. Marginal rim narrow but distinct.



42

43

Fig. 42—43. "*Orthomorpha*" *bisulcata* Pocock, lectotype ♀. — 42: left side of the 10th and 11th somites, dorsal aspect. 43: left side of the 10th somite, lateral aspect

Keels of the 3rd somite also on a rather low level. Border anteriorly narrowly rounded, laterally widely rounded; no latero-anterior tooth. Posterior border narrow and a little concave. Latero-posterior edge about right-angled, projecting slightly caudad of the margin of the somite. Marginal rim narrow. Keels of the 4th somite similar to those of the 3rd, but the anterior rounding wider. The latero-posterior edge slightly acute-angled, not projecting behind the margin of the somite. Keels of the 5th and subsequent somites (fig. 42—43) with the anterior border widely rounded. The lateral border a little emarginate in the middle but without distinct tooth in front of the emargination. Posterior edges acute-angled and projecting a little behind the margin from the 11th somite onwards, although scarcely in the 19th somite. From about the 11th or 12th somite the posterior edges become more spiniform or uncate, the spines curving inwards a little. Marginal rim of keels narrow, widening around the pore which lies in a distinct, elliptical excavation.

Sternites and legs. — Sternite in middle somites one and a quarter times longer

than broad. Cross impressions well developed; the longitudinal furrow almost as deeply impressed as the transverse furrow. No sternal cones. Pubescence moderately dense, the hairs rather long. Legs rather long, slender. The 1st pair somewhat incrassate; the last legs not modified. Pubescence moderate, but rather dense in the tarsi. Length of podomeres: $3 > 6 > 5 = 2 > 4$; the 6th podomere six sevenths of the length of the 3rd.

Aanal somite. — Epiproct rather broad and short, rather thick. The sides converging concavely, not parallel before the end. Preterminal lateral tubercles distinct. The end moderately narrow, truncate and faintly emarginate; no terminal knobs. Basal setiferous tubercles rather weak. Ventral side of epiproct not concave. Valves shiny, rugose. The marginal rims of moderate width and height. Setiferous tubercles weakly developed. Hypoproct trapezoidal, with the sides concave and the posterior border practically straight. Setiferous tubercles absent, the setae arising simply from the edges.

Remarks.

Like the foregoing species, *bisulcata* stands isolated and cannot be assigned to any of the known Burmese genera. The species has some particular features, like a transverse furrow from the collum to the 19th somite as well as a longitudinal furrow, the coarse beads of the stricture, the conspicuously coarse granulation of the sides, the structure of the lateral keels, etc., which in combination may well allow of a generic allocation, eventually.

It may be possible that this species too belongs to a genus of the group of *Tetracentrosternus, Pocockina,* etc., but only the discovery of the male of this or of a closely related species can solve the problem.

ATTEMS (1903) recorded this species from Java, Tjibodas, but this record, published without any comment, for mere geographical reasons must have been based on a misidentification.

REFERENCES

ATTEMS, C., 1898. System der Polydesmiden, I. Theil. Denkschr. k. Akad. Wiss., math.-naturw. Cl. 67 : 221—482, pl. 1—11.

———, 1903. Beiträge zur Myriopodenkunde. Zool. Jahrb. (Syst.) 18 : 63—154, pl. 5—11.

———, 1936. Diplopoda of India. Mem. Ind. Mus. 11 : 133—323.

———, 1937. Polydesmoidea I, Fam. Strongylosomidae. Das Tierreich 68 : I—XXII, 1—300.

———, 1938. Die von Dr. C. Dawydoff in französisch Indochina gesammelten Myriopoden. Mém. Mus. Nat. Hist. nat. (n.s.) 6 : 187—353.

———, 1940. Croisière du Bougainville aux Iles Australes Françaises, VI. Myriopodes. Mém. Mus. Nat. Hist. nat. (n.s.) 14 : 271—282.

———, 1953. Myriopoden von Indochina. Expedition von Dr. C. Dawydoff (1938—1939). Mém. Mus. Hist. nat. (n.s.) [A] 5 : 133—230.

CARL, J., 1902. Exotische Polydesmiden. Rev. Suisse Zool. 10 : 563—679, pl. 10—12.

———, 1922. Diplopoden aus Sumatra, Java, Malakka und Ceylon. Zool. Jahrb. (Syst.) 44 : 565—578.

———, 1932. Diplopoden aus Süd-Indien und Ceylon. 1. Teil. Polydesmoidea. Rev. Suisse Zool. 39 : 411—529.

———, 1935. Polydesmiden gesammelt von Major R. W. Hingston auf der III. Everest-Expedition, 1924. Rev. Suisse Zool. 42 : 325—340.

———, 1941. Orientalische Polydesmoiden. Rev. Suisse Zool. 48 : 359—376.

CHAMBERLIN, R. V., 1921. New Chilopoda and Diplopoda from the East Indian Region. Ann. Mag. nat. Hist. (9) 7 : 50—87.

HOFFMAN, R. L., 1963. A contribution to the knowledge of Asiatic Strongylosomoid Diplopoda (Polydesmida : Strongylosomatidae). Ann. Mag. nat. Hist. (13) 5 : 577—593.

HUMBERT, A., 1865. Essai sur les Myriapodes de Ceylan. Mém. Soc. phys. Hist. nat. Genève 18 : 1—62, pl. 1—5.

JEEKEL, C. A. W., 1963. Paradoxosomatidae from Borneo (Diplopoda, Polydesmida). Tijdschr. Ent. 106 : 205—283.

———, 1964. Two new species of Pratinus Attems, with taxonomic notes on the genus and a redescription of its type-species (Diplopoda, Polydesmida). Beaufortia 11 : 61—73.

———, 1964. Notes on the genus Akamptogonus Attems, with descriptions of a new genus and species from New Guinea (Diplopoda, Polydesmida). Nova Guinea, Zool. 29 : 105—113.

———, 1965. A revision of the South American Paradoxosomatidae in the Museo Civico di Storia Naturale di Genova (Diplopoda, Polydesmida). Ann. Mus. civ. Stor. nat. Genova (in press).

PETERS, W., 1864. Übersicht der im Königl. zoologischen Museum befindlichen Myriopoden aus der Familie der Polydesmi, so wie Beschreibungen einer neuen Gattung, Trachyjulus, der Juli und neuer Arten der Gattung Siphonophora. Monatsber. k. Akad. Wiss. Berlin 1864 : 529—551.

POCOCK, R. I., 1890. On the Myriopoda of Burma. Pt. 1. Report on the Oniscomorpha collected by Sig. L. Fea, by Mr. E. W. Oates and by the late Sig. G. B. Gomotto. Ann. Mus. civ. Stor. nat. 30 : 384—395.

———, 1892. Report upon two collections of Myriopoda sent from Ceylon by Mr. E. E. Green, and from various parts of Southern India by Mr. Edgar Thurston, of the Government Central Museum, Madras. J. Bombay nat. Hist. Soc. 7 : 131—174, pl. 1—2.

———, 1893. On the Myriopoda of Burma. Pt. 3. Report on the Julidae, Chordeumidae and Polyzonidae collected by Sig. L. Fea and Mr. E. W. Oates. Ann. Mus. civ. Stor. nat. Genova 33 : 386—406.

———, 1895. The Myriopoda of Burma, Pt. IV. Report upon the Polydesmoidea collected by Sig. L. Fea, Mr. E. W. Oates and others. Ann. Mus. civ. Stor. nat. Genova 34 : 787—834.

———, 1896. Supplementary note upon the Juloidea, containing descriptions of three new species. Ann. Mus. civ. Stor. nat. Genova 36 : 349—352.

VERHOEFF, K. W., 1930. Über einige Chilognathen aus Ceylon, nebst vergleichend-morphologischen Notizen. 117. Diplopoden-Aufsatz. Zool. Anz. 89 : 193—210.

———, 1936. Ueber einige Indische Chilognathen gesammelt von Herrn S. Jones, Madras. Rec. Ind. Mus. 38 : 103—123, pl. 5—8.

———, 1937. Zur Kenntnis indisch-ostasiatischer Diplopoden, Polydesmoidea. Zool. Anz. 120 : 306—319.

———, 1939. Diplopoden der Insel Mauritius und ihre zoogeographische Bedeutung. Jena. Zeitschr. Naturw. 73 : 37—96, pl. 2—6.

WEIDNER, H., 1960. Die entomologischen Sammlungen des Zoologischen Staatsinstituts und Zoologischen Museums Hamburg. III. Teil. Chilopoda und Progoneata. Mitt. Hamburg. Zool. Mus. Inst. 58 : 57—104.

Tijdschrift voor Entomologie

Het verschijnt in één deel van 350—450 bladzijden per jaar, bestaande uit enkele afleveringen.

Entomologische Berichten

Deze zijn bestemd voor de publicatie van kortere artikelen, faunistische notities etc., alsmede van de Verslagen der Vergaderingen en van mededelingen van het Bestuur. Zij verschijnen twaalf maal per jaar in een aflevering van 16 of meer bladzijden, die samen een deel vormen.

Trichopterorum Catalogus

Deze Catalogus van F. C. J. Fischer wordt door de Vereeniging voor rekening van de auteur uitgegeven. Alle bekende recente en fossiele soorten van de gehele wereld met hun synoniemen worden er in behandeld. Delen I en II kosten f 39.— per stuk, delen III—V: f 45.—. Er zullen in totaal 15 delen verschijnen. Van alle delen zijn ook éénzijdig bedrukte exemplaren beschikbaar. De prijsverhoging hiervoor bedraagt f 2.50.

Entomologia Experimentalis et Applicata

Dit tijdschrift wordt uitgegeven door de Noord-Hollandse Uitgevers Maatschappij te Amsterdam in opdracht van de Vereeniging. Het publiceert artikelen over experimentele biologie en oekologie bij insecten en andere land-arthropoden. Het verschijnt vier maal per jaar en bevat 320 bladzijden. De prijs voor leden bedraagt f 25.—, voor niet-leden f 40.— per jaar.

Alle zakelijke correspondentie betreffende de Vereeniging te richten aan de Secretaris, W. Hellinga, Weesperzijde 23II, Amsterdam-O.

Alle correspondentie over de redactie van het Tijdschrift voor Entomologie en de Monographieën te richten aan de Redacteur, Dr. A. Diakonoff, Rijksmuseum van Natuurlijke Historie, Leiden.

Alle correspondentie over de redactie van de Entomologische Berichten te richten aan de Redacteur, B. J. Lempke, Oude IJselstraat 12III, Amsterdam-Z. 2.

Alle correspondentie over de redactie van Entomologia Experimentalis et Applicata te richten aan de Redacteur, Dr. P. A. van der Laan, Lab. voor Toegepaste Entomologie, Linnaeusstraat 2 B, Amsterdam.

Alle betalingen te richten aan de Penningmeester, Drs. H. Wiering, Doorntjes 29, Bergen (N.H.), postgiro 188130, ten name van de Nederlandsche Entomologische Vereeniging te Bergen (N.H.).

Alle correspondentie betreffende de Bibliotheek der Vereeniging te richten aan de Bibliotheek, Zeeburgerdijk 21, Amsterdam-O.

Notice to Subscribers

All correspondence referring to subscriptions and exchange of the periodicals of the Netherlands Entomological Society should be addressed to the Librarian, Zeeburgerdijk 21, Amsterdam-O, Netherlands.

NOTICE TO CONTRIBUTORS

Contributors will receive free of charge fifty reprints of their papers, joint authors have to divide this number between them at their discretion. Additional reprints may be ordered when returning proofs.

Manuscripts should be written in Dutch, English, French, German or Italian. If they contain descriptions of new genera, species, etc., they should be in one of the four last mentioned languages.

The author should communicate with the editor before submitting his manuscript. He will enclose with manuscript a Synopsis (Abstract), styled according to recommendations of the UNESCO (style rules will be provided by the editor) and, if needed, a Summary. Papers in Dutch should contain an Abstract and/or a Summary in one of the four other languages.

Manuscripts should be typewritten in double spacing on only one side of the paper, with a margin of at least three cm at the left side of each sheet. Paragraphs should be indented. Carbon copies cannot be accepted, as handling makes them illegible.

Captions for text figures and plates should be written on a separate sheet in double spacing, numbered consecutively in arabic numerals; the use of a, b, c, or any other subdivision of the figure numbering should be avoided.

Drawings for reproduction should be on good paper in Indian ink, preferably at least one and a half times as large as the ultimate size desired. Lettering should be uniform, and, after reduction, of the same size. Photographs should be furnished as shiny positive prints, unmounted. Plates should be arranged so as to fill a whole page (11.5 x 19 cm) of the *Tijdschrift,* or a portion thereof, captions included. Combinations of illustrations into groups are preferable to separate illustrations, since there is a minimum charge per block.

Names of genera and lower systematic categories, new terms and the like are to be underlined by the author in the manuscript by a single straight line. Any other directions as to size or style of the type are given by the editors, not by the author. Italic type or spacing to stress ordinary words or sentences is to be avoided. Dates should be spelled as follows: either "10.V.1948" or "10 May, 1948". Other use of latin numerals should be avoided, as well as abbreviations in the text, save those generally accepted. Numbers from one to ten occurring in the text should be written in full, one, two, three, etc. Titles must be kept short. Footnotes should be kept at a minimum.

Bibliography should not be given in footnotes but compiled in a list at end of the paper, styled as follows:

Mosley, M. E., 1932, "A revision of the European species of the genus *Leuctra* (Plecoptera)". — Ann. Mag. Nat. Hist. [10] 10 (3): 1—41, pl. 1—5, fig. 1—57. Number of issue should only be added (in parentheses) when it has individual pagination.

Text references to this list might be made thus:

"Mosley (1932) says...." or "(Mosley, 1932)".

The editors reserve the right to adjust style to certain standards of uniformity.

Manuscripts and all communications concerning editorial matters only should be sent to: Dr. A. DIAKONOFF, Rijksmuseum van Natuurlijke Historie, Leiden, The Netherlands.

DEEL 108 AFLEVERING 6 1965

TIJDSCHRIFT VOOR ENTOMOLOGIE

UITGEGEVEN DOOR

DE NEDERLANDSCHE ENTOMOLOGISCHE VEREENIGING

INHOUD:

Tijdschrift voor Entomologie, deel 108, afl. 6. Gepubliceerd 17-IX-1965

Nederlandsche Entomologische Vereeniging

Bestuur

Prof. Dr. J. van der Vecht, *President* (1961—1967), Oegstgeest.
Dr. G. Barendrecht, *Vice-President* (1965—1971), Amsterdam.
W. Hellinga, *Secretaris* (1963—1969), Amsterdam.
Drs. H. Wiering, *Penningmeester* (1962—1968), Bergen (N.H.).
Drs. C. A. W. Jeekel, *Bibliothecaris* (1960—1966), Amsterdam.
J. A. Janse (1964—1970), Bennebroek.
Dr. A. F. H. Besemer (1965—1970), Bennekom.

Commissie van Redactie voor de Publicaties

Prof. Dr. J. van der Vecht (1961—1967), Oegstgeest.
P. Chrysanthus (1964—1967), Oosterhout (N.B.).
Dr. A. Diakonoff (1964—1967), Leiderdorp.
G. L. van Eyndhoven (1963—1966), Haarlem.
Dr. L. G. E. Kalshoven (1964—1967), Blaricum.
Prof. Dr. D. J. Kuenen (benoemd 1957), Leiden.
Dr. P. A. van der Laan (benoemd 1957), Bennekom.
B. J. Lempke (1965—1968), Amsterdam.
Prof. Dr. J. de Wilde (benoemd 1957), Wageningen.
Dr. J. T. Wiebes (1963—1966), Leiden.

Bestuur der Afdeling voor Toegepaste Entomologie

Dr. A. F. H. Besemer, *Voorzitter*, Wageningen.
Ir. P. Gruys, *Secretaris,* Rheden.
Dr. Ir. L. Bravenboer, Naaldwijk.
Dr. C. F. A. Bruyning, Oegstgeest.
Dr. Ir. J. B. M. van Dinther, Bennekom.

De contributie voor het lidmaatschap bedraagt f 15.—, voor student-leden f 2.50, per jaar. — Begunstigers betalen jaarlijks tenminstet f 15.—.

De leden, behalve de student-leden, ontvangen gratis de *Entomologische Berichten,* waarvan de prijs voor student-leden f 1.50 per jaar, voor niet-leden f 20.— per jaar en f 2.— per nummer bedraagt.

De leden kunnen zich voor f 10.— per jaar abonneren op het *Tijdschrift voor Entomologie*; hiervan bedraagt de prijs voor niet-leden f 35.— per jaar.

De eerder verschenen publicaties der Vereeniging zijn voor de leden tegen verminderde prijzen verkrijgbaar. De Vereeniging geeft de volgende publicaties uit.

Monographieën van de Nederlandsche Entomologische Vereeniging

Deze worden met onregelmatige tussenpozen uitgegeven. Er zijn reeds verschenen:

— F. T. Valck Lucassen et al. — Monographie du genre Lomaptera Gory & Percheron (Coleoptera, Cetoniidae), prijs f 50.—.

1. A. J. Besseling. — De Nederlandse Watermijten (Hydrachnellae Latreille, 1802), prijs f 25.—.

OBSERVATIONS ON SOME INDONESIAN SCALE INSECTS

BY

A. REYNE

Zoölogisch Museum, Amsterdam

Abstract

Additional data are given on the biology of the myrmecophile genus *Hippeococcus* Reyne (REYNE, 1954; BUCHNER, 1957). A description is presented of a Pseudococcid larva which is transported by flying ants in Sumatra (ROEPKE, 1930). There follow descriptions of *Ceroplastes sumatrensis* spec. nov. and of *Buchnericoccus javanus* gen. et spec. nov. Furthermore, records and redescriptions are given of *Pseudococcus hispidus* Morrison, from Java, found in an aphid gall; of *Hemaspidoproctus cinereus* (Green), in West Java; and records of some *Drosicha* species from Java.

Finally a report is added of the study of some 100 males of Monophlebinae from Indonesia, largely caught at lamp light, the females of which are unknown. *Drosichoides haematoptera* (Cockerell) is widely distributed in Java and Borneo. Males of the following new species are described: *Drosicha minor* (small islands in the Java Sea), *Monophlebulus toxopei* and *M. montanus* (West New Guinea). The genus *Monophlebulus* Cockerell was hitherto only known from non-tropical Australia.

Contents

1. HIPPEOCOCCUS REYNE, 1954

In a former paper (1954) I have described three species of this remarkable Pseudococcid genus from Java. BUCHNER (1957) published an elaborate study on the development and reduction of the mycetome of *Hippeococcus*.

These insects feed on different trees and plants, and are always attended by ants of the genus *Dolichoderus*. Though the larvae of *Hippeococcus* are often very abundant on these plants, adult females are usually scarce, and always immature, without eggs or embryos, as was already reported by VAN DER GOOT (1929). When the attending ants are disturbed and run away, the agile coccids quickly climb upon them. As the ungual digitules of the coccids are shaped like sucking cups, they are able to hold on tightly to the smooth body of the ant.

When examining the ants' nests it appears that they contain a large quantity of mature *Hippeococcus* females, wholly filled with full-grown embryos. It seems that the females only come to maturity in the ants' nests, and that the emerging larvae are transported to their food-plants by the ants. Adult females of *Hippeo-*

coccus have peculiar flat spatular hairs on the dorsum (REYNE, 1954, fig. 20 and 47), connected with glandular tissue; perhaps this tissue produces some substance, by taste or odour attractive for the ants. Wax is certainly not produced by it, as the cuticle of *Hippeococcus* is quite smooth, without any waxy coating. In the ants' nests no adult female *Hippeococcus* were found attached to roots. It is a question, or rather a bold guess, whether the adult females of *Hippeococcus* are fed by the ants; they certainly want a large quantity of food for the production of embryos. Perhaps this question can be solved when using artificial ants' nests, as it is impossible to observe this in natural nests.

According to BUCHNER (1957) the mycetome in *Hippeococcus* develops in the same way as in *Pseudococcus,* but it remains sterile, without symbionts. Finally the majority of the mycetome cells is transformed into fat cells. BUCHNER supposes that the female *Hippeococcus* comes to maturity by being fed by the ants, as has been observed in the aphid *Paracletus cimiciformis* VON HEYDEN, 1837*). When in Blattidae and other insects the symbionts are destroyed by antibiotics the adults do not attain sexual maturity.

As mentioned above, the flat dorsal hairs are connected with glandular tissue. I am indebted to professor BUCHNER who examined, on my request, his sections of adult females of *Hippeococcus.* He found under the whole cuticle a layer of glandular cells, often connected with each other by thin strands of protoplasm. He did not find undifferentiated epithelium cells, though in the larvae these cells form a continuous layer, only interrupted by basal cells of the large setae. In the sections of the adult females most setae were broken, but the flat spatular hairs were often present. Professor BUCHNER added to his letter of 6.III.1954 two pencil-drawings, made with a camera lucida, which are copied in fig. 1.

After the publication of my 1954 paper on *Hippeococcus* Dr. HAROLD MORRISON submitted to me three old slides from the National Collections at Washington, D.C., with request to identify these *Hippeococcus* species. The result was as follows.

(1) A slide with four specimens, Mt. Boender (BRYANT and PALMER), 20.V.1909. Mt. Boender is a small mountain (about 800 m) at the foot of Mt. Salak (2200 m) in the environment of Bogor (West Java). The expedition of BRYANT and PALMER explored Mt. Salak and Mt. Boender in May 5—31, 1909 (according to *Flora Malesiana,* vol. 1); the Government resthouse at Mt. Boender was probably their abode. The four specimens belong to a variety or closely allied species of *Hippeococcus wegneri* Reyne, 1954. The apex of the abdomen is more elongate than in *wegneri*; the sclerite with the anal ring reaches beyond the top of the anal lobes (fig. 2). Though most of the setae are missing, the presence of six apical setae on the anal lobes could be recognized by their sockets; one of the setae is implanted more forward than the five other (REYNE, 1954, fig. 43).

In July, 1929 VAN DER GOOT (1929) collected a *Hippeococcus* on the northern summit of Mt. Salak, but a figure or description of this species is wanting. I

---

*) ZWÖLFER (1958, *Zeitschr. angew. Entom.* 42 and 43) does not produce a convincing proof that this aphid, living in the nests of *Tetramorium caespitum,* is really fed by the ants. Such proof could probably be furnished in artificial ants' nests where the ants are fed with honey mixed with some radioactive compound.

presume that VAN DER GOOT thought that it was the same species as the one he had formerly found in the Tengger Mts. (East Java) and near Garut and Bogor (West Java). VAN DER GOOT states that already in 1909 EDWARD JACOBSON had found *Hippeococcus*, in association with *Dolichoderus gibbifer* Emery, in the Tengger Mts., East Java. From the present slide it appears that in 1909 *Hippeococcus* has also been collected in West Java, but the insects remained unnamed untill 1954.

(2) No. Q 22075. On *Rubus moluccanus,* Java (at 1200 m), coll. E. JACOBSON, Dec., 1912. No locality mentioned on the label, neither could the locality be established in Washington. The slide contains eight specimens, almost certainly belonging to *H. wegneri.*

(3) Labelled: Porspo, coll. P. VAN DER GOOT, 2.II.1913. The slide contains one specimen which is almost certainly *H. rappardi* Reyne, 1954. Dr. L. G. E. KALSHOVEN informed me that Poespo is meant, a locality in the Tengger Mts. at about 650 m, where VAN DER GOOT used to collect aphids in 1913, when on the staff of the Sugar Cane Experiment Station at Pasuruan.

Identification of the specimens of these old slides is mainly based on the anal lobes and their apical setae. It is certain that *H. montanus* (REYNE, 1954, figs. 39—40) was not present on these slides.

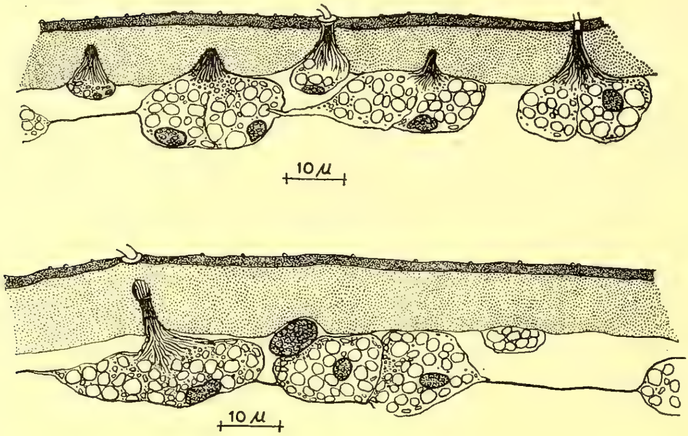
2. A PSEUDOCOCCID LARVA TRANSPORTED BY FLYING ANTS

In 1954 I received from the late Prof. Dr. W. ROEPKE a slide with a female winged ant, mounted with a coccid-larva between the mandibles. A number of these insects were collected by ROEPKE in August, 1929, during a visit to a plantation in Serdang district, East coast of Sumatra.

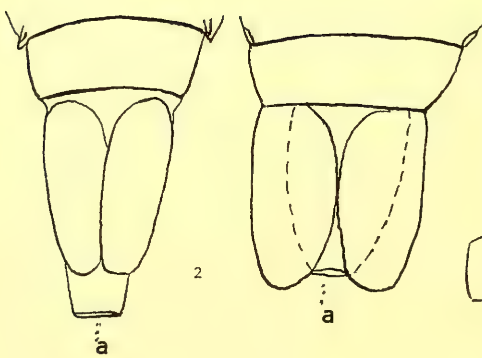
ROEPKE (1930) published a description of this remarkable case of myrmecophily, but was not able to identify the coccid larva. He remarks that it would be interesting to search the nests of these ants in order to obtain adult specimens, and to study the relation between ants and coccids more closely.

As far as ROEPKE knew, this transport of coccids by ants during nuptial flight was a unique case, but SILVESTRI (1924) mentions a similar case in his description of *Xenococcus annandalei,* a coccid from nests of the ant *Acropyga acutiventris* Roger, 1862, in the district of Madras, India. According to Dr. N. ANNANDALE the female ants transport the scale insects between the jaws during nuptial flight. The same *Xenococcus* species was also found at Penang, about 250 km from Serdang, in Tongking, North Vietnam, and near Hongkong (SILVESTRI, 1926). In 1926, SILVESTRI described *Eumyrmococcus smithii,* from nests of *Acropyga* (*Rhizomyrma*) *sauteri* Forel, 1912, in China (Macao, Shanghai); according to TAKAHASHI (1934) this scale insect is also known from Formosa and Japan. It is closely allied to *Xenococcus*, and SILVESTRI supposes that *Eumyrmococcus* is also transported by the ants during nuptial flight, but observations of this phenomenon were lacking.

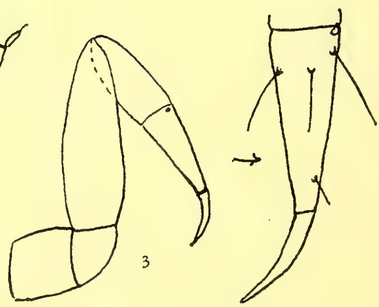
SILVESTRI (1924, 1926) does not comment on the systematic position of his new genera *Xenococcus* and *Eumyrmococcus.* My own opinion is that *Xenococcus annandalei* certainly belongs to the Pseudococcidae, as two medioventral circuli are present on the second and third abdominal segments (SILVESTRI, 1924, fig.,



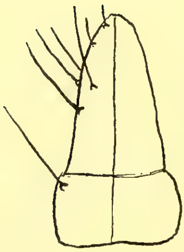
1



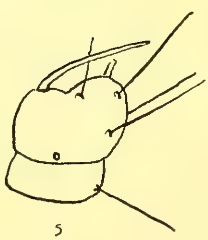
2



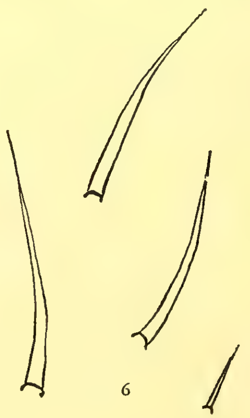
3



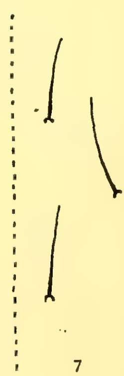
4



5



6



7

I and V). The position of the setae on the rostrum (fig. II) also points to the Pseudococcidae. The tarsus and the claw with short, acute digitules reminded SILVESTRI of the Ortheziinae, but other characters were quite different. In my opinion the tarsus and the claw may equally well be compared with those of *Rhizoecus* species, belonging to the Pseudococcidae. This applies also to *Eumyrmococcus* where the claw with its minute digitules is as long as the tarsus (SILVESTRI, 1926, fig. II 5); for comparison with a *Rhizoecus* species, fig. 28 in HAMBLETON (1946) may be mentioned. The rostrum or labium of *Eumyrmococcus* with its setae (SILVESTRI, 1926, fig. II) also clearly points to the Pseudococcidae.

According to BÜNZLI (1935) the larvae of *Rhizoecus coffeae* Laing, 1925, are transported in Surinam by the females of *Acropyga* (*Rhizomyrma*) *paramaribensis* Borgmeier, 1933, during nuptial flight (pp. 550—552, and fig. 41 and 44 B). In 1924, when on the staff of the Agricultural Experiment Station in Surinam, I have often collected the above-mentioned *Rhizoecus* on roots of the coffee-tree. LAING (1925) described the species as *R. coffeae*, from material which I had sent to the British Museum for identification. My observations of this insect were made in connection with the phloem necrosis of the coffee-tree in Surinam, a disease killing many trees. Observing that this insect was often very abundant on the roots of the coffee-tree, and was feeding on the phloem, I supposed that *Rhizoecus* either caused or transmitted the disease; in 1924 it was not known whether the phloem necrosis was caused by a virus or some organism*). The ants which were often found in association with *Rhizoecus coffeae* were collected but not studied more closely, as I left Surinam in July, 1924. These ants were described in 1933 by BORGMEIER as *Rhizomyrma paramaribensis*, and afterwards studied in detail by BÜNZLI (1935).

The larva of ROEPKE's slide shows only a few details, being partly covered by the mandibles and the antennae of the ant, while the specimen is not macerated. ROEPKE (1930), who had also specimens in alcohol, published figures of the habit, the tibia with tarsus, the antennae, and the tip of the rostrum (fig. C—G).

*) STAHEL (1931, 1933), who made an elaborate study of this disease, finally discovered that the phloem necrosis in the roots and root collar of the coffee-tree is preceded by a large number of flagellates, clogging the sieve tubes. BÜNZLI (1935, p. 559/60) claimed to have proved that the disease is transmitted by *Rhizoecus coffeae* Laing, but STAHEL denied this.

Fig. 1—2. *Hippeococcus wegneri* Reyne, adult female. 1, Transverse section of dorsal cuticle and underlying glandular cells (× 800). After unpublished pencil drawings by Prof. P. BUCHNER; the cuticle, which is dotted in the figure, shows a faint horizontal striation in the original drawing; 2, two last abdominal segments in ventral aspect (× 90); posterior ostioles shown in upper and anal ring (a) in lower part of the figures. Right, a normal specimen, (Tjibodas). Left, a specimen from Mt. Boender, a variety of *H. wegneri*.

Fig. 3—5. Pseudococcid-larva, transported by an ant during its nuptial flight. 3, outline of fore leg (× 300) and its tarsus (× 650); 4, labium, in ventral aspect (× 460); 5, antenna (× 650); one sensory seta clearly visible, broken seta at top is probably also a sensory seta.

Fig. 6—7. *Pseudococcus hispidus* Morrison, adult female. 6, dorsal setae (× 460); 7, ventral setae (× 460)

Wax pores and ostioles are wanting, as far as I could observe, but this applies also to the genera *Xenococcus* and *Eumyrmococcus* of SILVESTRI. It seems, however, that ROEPKE's larva also belongs to the Pseudococcidae. The rostrum or labium (fig. 4) shows a setal pattern resembling that of the Pseudococcid genus *Rhizoecus* Künckel, 1878; compare fig. 16 in WILLIAMS (1962).

The tapering tarsus (fig. 3) with large claw (about half as long as the tarsus), and a sensorium at its base, also resembles that of *Rhizoecus* Künckel; cf., e.g., fig. 28 in HAMBLETON (1946). The ungual digitules are wanting or extremely small as in *Eumyrmococcus* (SILVESTRI, 1926, fig. II 5). The two-segmented antenna in the present larva is very short (fig. 5), as in *Eumyrmococcus* (SILVESTRI, 1926, fig. II 3). The anal ring seems to be very narrow, but this remains uncertain as in the available slide its position is vertical. The number or anal hairs could not be fixed (8 ?), as some other large setae are placed at the apex of the abdomen.

It seems to me that the present larva shows more resemblance to *Eumyrmococcus* than to *Xenococcus* (two-segmented short antennae, no circuli, no longer setae on ventral side of the abdomen). A definite identification of the available larva will only be possible when the adult females, probably living on roots in ants' nests, are collected. SILVESTRI (1926) has only described the adult females of *Eumyrmococcus*, but not the larvae.

The ant, which transports coccid larvae in Sumatra during nuptial flight, was provisionally identified as a species of *Cladomyrma* Wheeler, 1920. BÜNZLI (1935 : 458) supposes that it may be a species of *Rhizomyrma* Forel, 1893; this subgenus of *Acropyga* Roger, 1863, has been reported from China (Macao, Shanghai), Formosa, New Guinea, and Sumatra. ROEPKE's ant from Sumatra was recently identified by G. E. J. NIXON, Commonwealth Institute of Entomology, London, as *Acropyga* (*Atopodon*) sp. FOREL (1913, 1915) reported *A.* (*A.*) *inezae, amblyops*, and *butteli* from Sumatra, and *A.* (*A.*) *termitobia*, from Malacca.

The structure of *Xenococcus, Eumyrmococcus,* and of the larva from Sumatra, is quite different from that of *Hippeococcus* (mentioned above, chapter 1), though they are all myrmecophilous Pseudococcidae. *Hippeococcus* feeds on green parts of plants and trees above the level of the soil, and only turns to subterranean life habits after the female has reached the adult stage. *Xenococcus* and *Eumyrmococcus* feed on roots, and remain permanently below the level of the soil, except when they are transported by flying ants in whose nests they live. *Hippeococcus* has two pairs of ostioles and trilocular wax-pores (though very few), typical features of the Pseudococcidae, absent in the above-mentioned species which have a more reduced structure. In *Hippeococcus* the ungual digitules are shaped like sucking-cups which enable them to climb upon the attending ants. In the species described above the ungual digitules are very short setae which are sometimes vestigial, as in *Eumyrmococcus,* or apparently wholly absent, as in ROEPKE's larva.

3. PSEUDOCOCCUS HISPIDUS MORRISON, 1921, IN AN APHID GALL

In 1951 I received from Mr. D. HILLE RIS LAMBERS a *Pseudococcus* sp., found in and on an aphid gall, caused by *Astegopteryx styracophila* Karsch, 1890, on

Styrax benzoin. The gall has been described by DOCTERS VAN LEEUWEN (1926). The gall from which the *Pseudococcus* was taken had been collected by Dr. A. DIAKONOFF in the Botanical Garden, Bogor, West Java, 10.VIII.1950.

The slide sent contained six adult females, and one larva of the first stage. The species can be described as follows:

Adult female. Body from 1.8 × 1.3 to 2.5 × 2.0 mm. Ovoviviparous; old females contain fully developed embryos with spirally coiled mouth setae. In one of the specimens an embryo with coiled mouth setae is just emerging from the vulva.

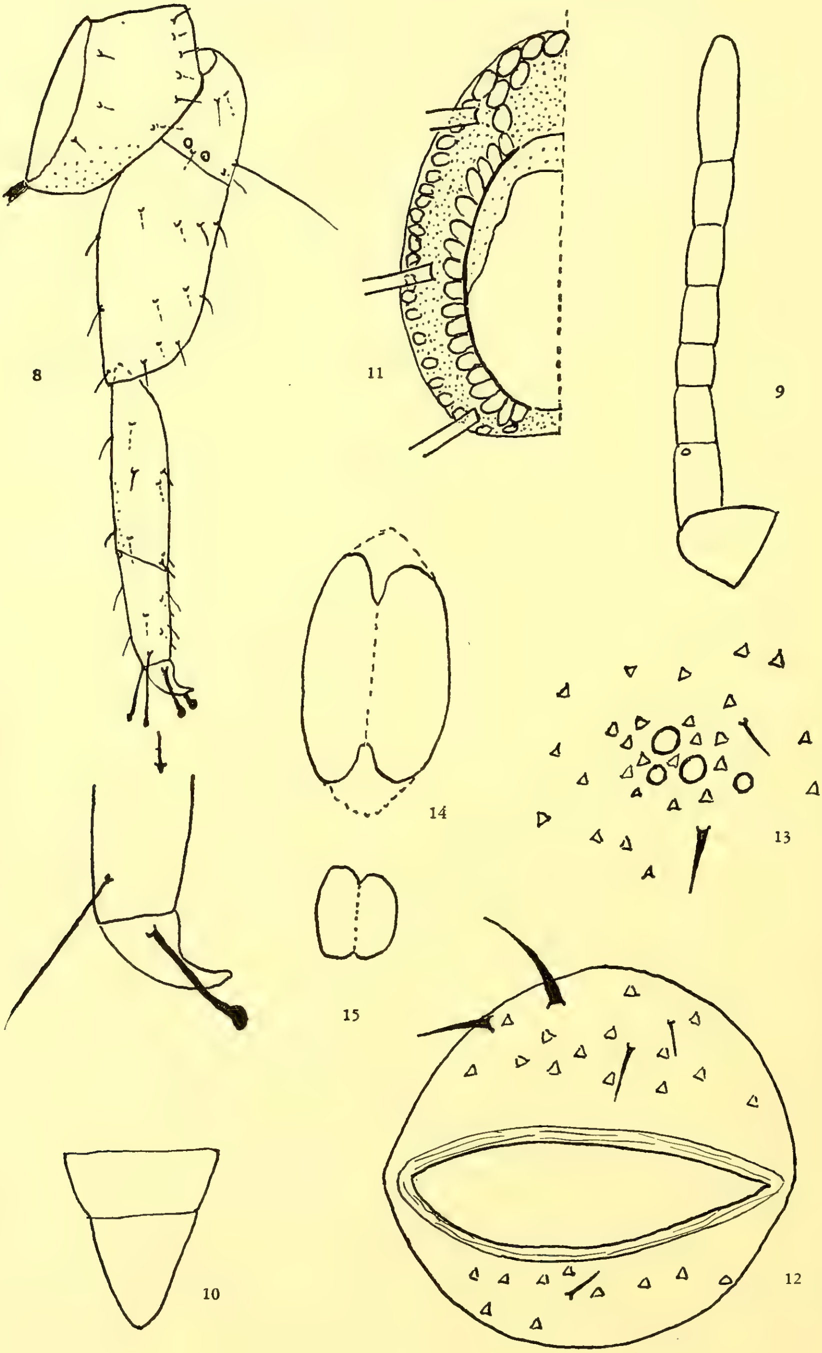
Antennae 8-segmented, length about 370 μ (fig. 9). Legs short and stout (fig. 8); length ca. 0.5 mm. In the hind legs the tibia is about 130 μ, and the tarsus 80 μ; the femur is 170 × 80 μ. The posterior coxae show a number of minute translucent pores; a few of similar pores are usually also present on the tibia (fig. 8). The digitules slightly longer than the claw and knobbed (fig. 8). The legs are provided with small setae (fig. 8); their number is usually as follows: coxa 9, trochanter 5, femur 12—14, tibia 8—10, and tarsus 6—8.

Labium (rostrum) pointed, triangular: length 120—130 μ, base 100 μ (fig. 10). The rostral loop reaches the line of the posterior coxae, when the mouth setae are withdrawn. The anal lobes are well sclerotized, apical seta 90—100 μ. The anal ring is of the common Pseudococcid type, with 2 rows of pores (fig. 11); length of the 6 anal setae 90—100 μ.

Dorsal side. Two pairs of ostioles which are almost round, and provided with sclerotized lips (fig. 12). There are 18 pairs of cerarii, each with 3—5 spines; cerarii with 2 or 6 spines are rare. The total number of cerarian spines on each side of the body is about 70 (average of 6 counts 67, variation 63—76). In the cerarii the spines are often of different size (fig. 13); further one spine may be separated from the other spines which are set closely together. In many cerarii 1—2 accessory setae are observed, in the 2 posterior cerarii 3—4 may be present. Sometimes 1—2 spines are so slender that it remains uncertain whether they should be interpreted as cerarian spines or as accessory setae. The posterior cerarius is set on a distinct sclerotized plate. Sometimes the bases of the 2 following cerarii are also sclerotized, but only slightly. Trilocular pores are the only type of wax-pores which are present on the dorsal side; there is a slight concentration of these pores in the cerarii (cf. fig. 13).

Abdomen and thorax are provided with a rather large number of stout setae (50—70 μ), next to short and slender setae (20 μ); see fig. 6. These stout setae are more or less regularly arranged in transverse rows on the abdomen; the largest setae are usually observed in the mediodorsal region. Stout setae may even occur on the lips of the posterior ostioles, though much reduced in size (fig. 12).

Ventral side. The setae are much shorter than the stout setae on the dorsal side, usually 20 μ, at most 30 μ (fig. 7). A medioventral circulus is present on the second and third abdominal segments and divided by the intersegmental line (fig. 14). Only in one specimen the circulus was clearly visible; width about 150 μ, length (along the middle line of the body) 100 μ. In the other specimens the circulus could be traced only with difficulty, in these specimens the circulus being folded along the intersegmental line, its weakly sclerotized rim hardly visible. In


8
11
9
14
13
15
10
12

the larva the circulus was clearly visible. Trilocular pores are distributed over the whole ventral side. Only very few, at most 5, multilocular pores were found, near the vulva which is situated opposite the anal ring. Multilocular pores are usually very scarce in ovoviviparous species. I failed to observe any tubular ducts on the ventral as well as on the dorsal side.

First stage larva. Length of body 0.6 mm. Antennae 6-segmented, about 200 μ. The posterior cerarius has only 2 spines, the 2 following cerarii are recognizable, but the spines are as slender as the other dorsal setae. The apical seta of the anal lobe as long as the anal setae. The stout dorsal setae, as found in the adult female, are already recognizable though their size is still very small. The circulus is clearly visible in my specimen; width and length about 50 μ (fig. 15).

Our species from the *Styrax* gall resembles *Pseudococcus hispidus* Morrison, 1921, from Singapore, and *Pseudococcus dorsospinosus* Wirjati, 1958, collected in the environment of Bogor. Similarity to *Pseudococcus jacobsoni* Green, 1930, from Sumatra and Java, was also noticeable, but an association of these species with galls has nowhere been mentioned. As I could not identify our species with the available literature with certainty, I sent it to Dr. D. J. WILLIAMS, Commonwealth Institute of Entomology, London. He felt sure that is was *Pseudococcus hispidus* Morrison which he had often received from Malaya, and that *Pseudococcus dorsospinosus* Wirjati may be the same species.

P. hispidus, as described by MORRISON (1921), has 7-segmented antennae, while in *P. dorsospinosus, P. jacobsoni,* and my own specimens the antennae are 8-segmented. MORRISON had only two specimens at his disposal, a slide from E. E. GREEN. From MORRISON's fig. 8 f it is evident that the antennal segments IV and V are fused, as a partial division on segment IV is shown in his figure; the dimensions of this segment IV, as reported in the text, corroborate our view. Further MORRISON's description agrees with our specimens, but the number of cerarian spines is larger is his specimens, viz., 80—97 on each side. In our specimens the average number was 67 (varying from 63 to 76). BETREM (1937) mentions an average of 70 for *P. jacobsoni,* and WIRJATI (1958), 71 for *P. dorsospinosus.* As was stated above, it is sometimes difficult to distinguish between a slender spine and an accessory seta, so that the number of spines in some cerarii is difficult to ascertain.

The number of stout dorsal setae in the above-mentioned species seems to be rather variable. GREEN (1930) states that the principal difference between his *P. jacobsoni* and *P. hispidus* Morrison is that in *P. jacobsoni* only five pairs of stout dorsal setae are present, viz., mediodorsally on the abdomen. BETREM (1937) does not mention that stout dorsal setae are restricted to the abdomen in *P. jacobsoni,* but considers the smaller number of cerarian spines and the 8-segmented antennae as the

---

Fig. 8—15. *Pseudococcus hispidus* Morrison, adult female. 8, hind leg (× 200) and claw with digitules (× 460); 9, outline of antenna (× 200); 10, outline of labium (× 200); 11, left half of anal ring, with bases of anal setae (× 650); 12, posterior ostiole (× 460); 13, penultimate cerarius (× 460); of broken cerarian spines only bases figured; 14, circulus (× 200); the broken line indicates the outline, when focusing more deeply; first stage larva; 15, circulus (× 200)

main difference with *P. hispidus*. WIRJATI (1958) figures the stout dorsal setae in *P. dorsospinosus* in a mediodorsal position on the thorax as well as on the abdomen (her fig. 4), and the number is much larger than five pairs, as mentioned by GREEN (1930). The largest dorsal setae in *P. dorsospinosus* are indistinctly two-jointed (WIRJATI, fig. 5). Like GREEN in *P. jacobsoni*, WIRJATI observed a circulus in *P. dorsospinosus* (her fig. 4). As Miss WIRJATI informed me, this circulus measures about 120 $\times$ 76 μ. In GREEN's figure of *P. jacobsoni* the circulus is approximately 100 $\times$ 27 μ; in our specimens of *P. hispidus* the dimensions were 130—150 $\times$ 60—100 μ. In MORRISON's description of *P. hispidus* and in BETREM's description of *P. jacobsoni* no mention of a circulus is made. The circulus in our specimens has a weakly sclerotized rim; being located across an intersegmental line on which it can easily fold, it can often be distinguished only with difficulty.

WIRJATI (1958) mentions as the principal difference between *P. dorsospinosus* and *P. hispidus* the 8-segmented antennae, the 2-jointed dorsal setae, the absence of pores on the posterior coxae and tibiae, and the sclerotization, restricted to the anal lobe, and not present under the two following cerarii, as in *P. hispidus*. *P. dorsospinosus* was collected in a virgin forest near Djasinga, W. Java, about 40 km from Bogor, and in a secondary forest near the South coast of West Java. The small size of this species (adult females from 1.1 $\times$ 0.8 to 1.8 $\times$ 1.4 mm) is perhaps due to the locality where it was collected*).

MORRISON (1921) observed a few multilocular pores near the vulva in *P. hispidus*; they were also present in our specimens. BETREM (1937) observed in *P. jacobsoni* from Central Java a single row of these pores behind the genital fissure and a few before it. GREEN (1930) and WIRJATI (1958) state that multilocular pores are absent in *P. jacobsoni* and *P. dorsospinosus*. MORRISON, GREEN, BETREM, and myself did not find tubular ducts in the examined specimens. WIRJATI reports, however, tubular ducts, though very scarce and minute, in the anterior and marginal area of *P. dorsospinosus*.

After comparing the descriptions of the above-mentioned authors with my own specimens I have come to the conclusion that *P. jacobsoni* Green, 1930, from Sumatra and Central Java is probably the same species as *P. hispidus* Morrison, 1921, from Malaya. This applies also to our own specimens; their occurrence in *Styrax*-galls seems to be only accidental. I am not quite certain about *P. dorsospinosus* Wirjati, 1958, as tubular ducts and bipartite setae seem to be absent in *P. hispidus* and *P. jacobsoni*.

Male stages have not been observed in *P. hispidus, jacobsoni*, and *dorsospinosus*, so that the reproduction may be parthenogenetic; in this case a wide range of variation can be expected, as mutations are not obscured by cross-breeding. With

*) WIRJATI states that scale insects in dusky virgin forest are usually very rare. In 1920 I have found a *Pseudococcus* sp. in a wild cacao forest in Surinam, far into the interior of primeval forest along the upper course of the Coppename River. From the cacao trees, which grew in the dusk under tall trees of the virgin forest, 100 fruits were examined. Among these fruits 29 showed scars of bees or wasps, while 5 were infested by a *Pseudococcus* sp.; 50 fruits were undamaged, and the rest were more or less malformed probably by other animals than insects. The *Pseudococcus* sp. was certainly an indigenous insect, considering the collecting locality.

parthenogenesis it is difficult to delimit well-marked species, and it is desirable to use a rather wide range when describing them.

In future *P. hispidus* Morrison has certainly to be removed from the genus *Pseudococcus* Westwood, 1840, but our knowledge of allied species is still too fragmentary, so that a more correct classification is not possible at present.

4. CEROPLASTES SUMATRENSIS spec. nov.

Dr. EDWARD JACOBSON collected in Febr., 1914, a remarkable species of *Ceroplastes* of which dry specimens are preserved in the Museum of Natural History at Leiden, labelled Nr. 3673. The insect was collected at Buo, Sumatra, about 70 km northeast of Padang, and is remarkable by four snow-white bands on the dorsal side (fig. 16); it was found on the leaves of a dicotyledonous plant, probably a shrub or tree.

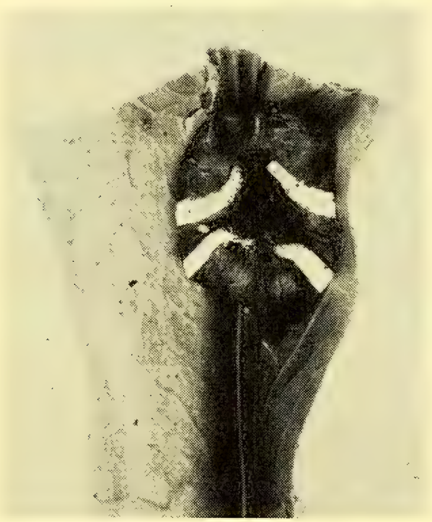


Fig. 16. *Ceroplastes sumatrensis* sp.n. Adult female on leaf (× 3); photograph by courtesy of the Leiden Museum

H a b i t. The waxy test shows a regular, elliptical base, with which it is attached to the leaves, especially along the larger veins (fig. 16). Dimensions of the larger specimens 7—8 × 5 mm, height 3—4 mm. After removal of the wax the adult female measures about 4.5 × 3 mm. Colour brown-yellow. The white bands arising from the stigmatic furrows almost reach the top of the dorsum which in younger specimens shows a pit or nucleus, obsolete or absent in older specimens. The white bands have a width of about 1 mm, and consist of parallel lines of pure white wax. These white bands are also present in the stigmatic furrows on the ventral side. White bands, as mentioned above, are visible in other *Ceroplastes* species, especially in young specimens, but I never saw them so distinctly developed as in *C. sumatrensis*. The wax of the dry specimens, collected 50 years ago, is very

hard and does not melt in boiling water; for *C. ceriferus* (Anderson, 1790) it is reported that the wax melts at 50—60° C. It was difficult to remove the wax in our specimens with a hot solution of 10% KOH. The solution took a brown or yellow colour, probably caused by the insect and not by the wax which was detached in white flocks.

Adult female. Four females were mounted. As is well-known, it is difficult to obtain suitable microscopic preparations of strongly sclerotized and very convex insects like *Ceroplastes* and other Lecaniidae. Moreover, our specimens had been preserved in a dry state during half a century. My preparations are defective, but the principal characteristics can be examined, including the stigmatic spines which in *Ceroplastes* are often an important feature for identification.

The specimens measured on the slide from 3.5 × 1.5 to 4.5 × 3.0 mm; length of body, excluding the anal process, from 2.8 to 3.3 mm (fig. 17).

Antennae 6-segmented. Length 270—300 μ, average of 6 antennae 285 μ (fig. 18).

Legs (fig. 19). Length 370—380 μ, average of 6 legs 374 μ; tarsus (without claw) about 60μ, tibia 100 μ. The digitules are longer than the claw and distinctly knobbed (fig. 20).

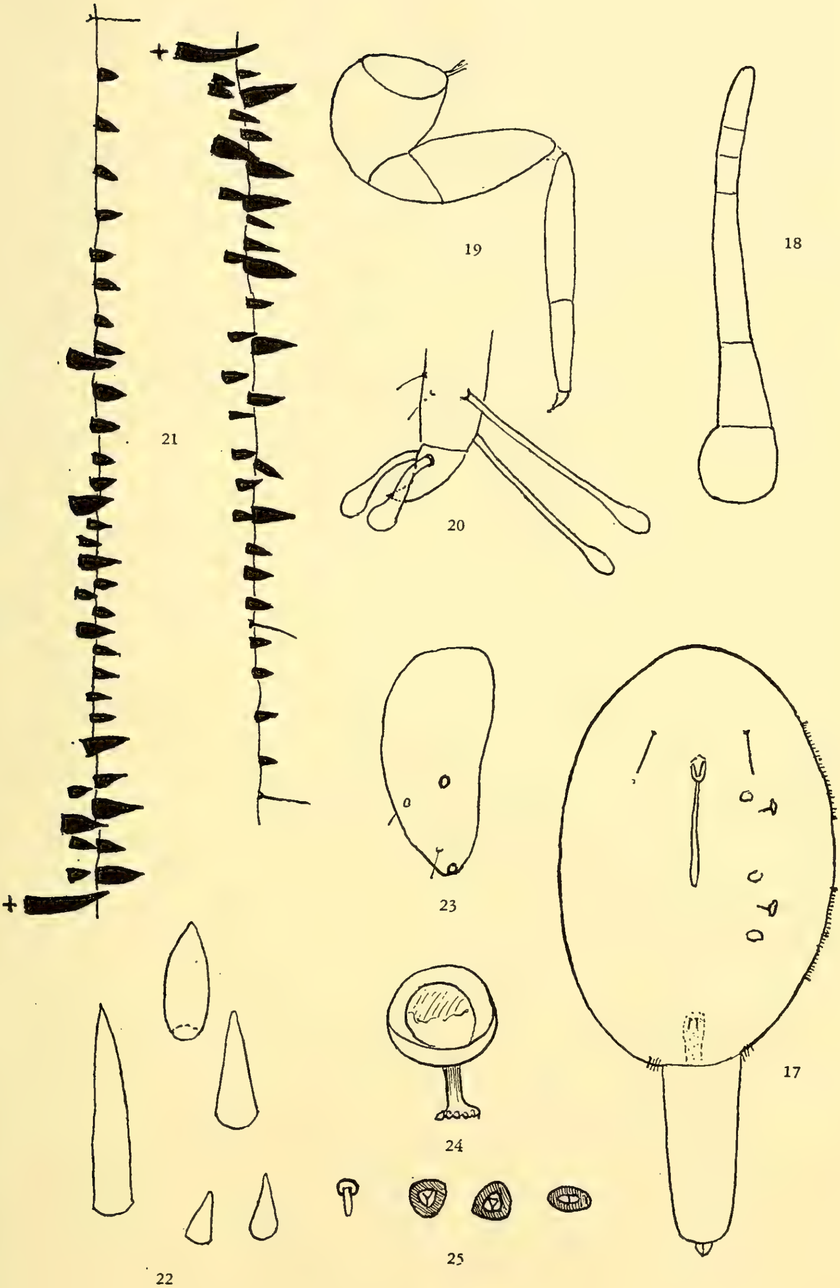
Anal process well developed; length 1.2 mm, width at base 0.50—0.65 mm (fig. 17). In one specimen, with the anal process almost detached from the body, its length was 1.7 mm. In a species from Curaçao, *C. magnicauda* Reyne, 1964, I saw that this process of the young adult female (already provided with multilocular pores) grows considerably in length till full maturity is reached, so that its length is variable according to the age of the adult female (REYNE, 1964, fig. 53). FERRIS (1948, p. 347) reports the same with reference to *C. rubens* Maskell, 1892.

Anal plates 140—150 μ long (fig. 23). The setae in my specimens are broken, but judging from their sockets the discal seta is the largest. The apical seta, near which 1—2 minute setae are found, seems to be the second largest seta. In two specimens a minute seta was also present on the outer margin of the anal plate, opposite the discal seta.

Anal fringe with 2 groups of 4 minute setae (20 μ). The anal ring and its setae could not be examined in our specimens. The tips of 4 anal setae were visible outside the anal fringe, but probably 6 are present.

Labium or rostrum one-segmented, with 4 pairs of setae. The rostral loop probably reaches the line of the middle coxae, or slightly further, when the protruded mouth setae are retracted.

Fig. 17—25. *Ceroplastes sumatrensis* n.sp., adult female. 17, insect on slide, ventral aspect, diagrammatic (× 20). Antennae, mouthparts, bases of legs, and spiracles indicated. Area with multilocular pores, as far as observable, is dotted. Along margin of body groups of stigmatic spines are indicated, and on anal process 2 anal plates; 18, outline of antenna (× 200); 19, outline of fore leg (× 200); 20, claw with digitules (× 650); 21, posterior group of stigmatic spines (× 200). Left, anterior half, right, posterior. The large spine, marked with a cross, is opposite the posterior spiracle; 22, stigmatic spines of different dimensions (× 460); 23, anal plate (× 200); 24, anterior spiracle (×200); 25, dorsal wax pores; left, a dorsal seta (× 650)


19
18
21
20
23
17
24
22
25

Stigmatic spines (figs. 17 and 21). Four groups of stigmatic spines are present opposite the spiracles. Length of the groups about 0.8 mm, sometimes 1.0 mm, of the intervening space ca. 0.5 mm. The anterior group contains 50—60 spines, and the posterior group 60—70 in our best specimen. The largest spines (30—40 μ) are opposite the spiracles, but they are mixed with smaller spines of which the smallest are only 15—20 μ long (fig. 22). The spines are largely arranged in a single row which is doubled in an irregular way in the middle of the group (fig. 21). A particularly large spine (50—60 μ) is usually present opposite the spiracles. Besides stigmatic spines some ordinary setae (30—35 μ) are present along the margin of the body, but only about a dozen on each side (3 are shown in fig. 21). On the anal lobes 3—5 larger setae (60—70 μ) are present; in fig. 17 they are indicated at the base of the anal process.

Dorsal side. Provided with many triangular wax pores with a thick sclerotized rim and 3 loculi; sometimes these pores have an elliptical outline and 2 loculi (fig. 25). Further minute cylindrical setae (fig. 25) are present which are less numerous than the trilocular pores. Sclerotized areas, excepting the anal process, were not observed in the 4 prepared specimens.

Ventral side. The spiracles are large (fig. 24); diameter of peritreme 70—80 μ. Three kinds of wax pores are present on the ventral side. Quinquelocular pores (3—4 μ) are present in the stigmatic furrows; along the body-margin they occupy a stretch of about 120—130 μ. Multilocular pores were observed near the base of the anal process, behind a pair of longer setae (60—80 μ); see fig. 17. In most Lecaniidae one or more pairs of longer setae are found medioventrally on the abdomen, in front of the genital opening. These setae help to find the area with multilocular pores which is often difficult to discover in *Ceroplastes* species. The pores are usually obscured by the strong sclerotization of the anal region. The multilocular pores are crowded in a small area, the distance of the pores being about 1—2 times their diameter which is 5—7 μ. Minute unilocular wax pores are probably distributed over the whole ventral side; their diameter is about 2 μ, and their opening not larger than 1 μ. Besides the 2 long setae mentioned above, 1—2 similar setae are present inside the antennae. Further minute setae like the dorsal ones, but pointed, are sporadically distributed over the whole venter.

Discussion. *Ceroplastes* is a large genus of which about 120—130 species and a number of varieties have been described. About 10 species are known from Indonesia. Less than 20 species are reported from tropical Asia, but almost 40 from Brasil alone. Tropical America, and in a lesser degree Africa, are the main areas of distribution. *Ceroplastes* species are difficult to identify. The specific differences are often vague; a critical revision of this large genus is not available.

C. sumatrensis shows some resemblance to *C. ceriferus* (Anderson, 1790), originally described from India, but at present known from most tropical countries, including Indonesia. It differs from *C. sumatrensis* in its waxy test, and stigmatic spines (compare the figures of the stigmatic spines of *C. ceriferus* in MORRISON (1920), KUWANA (1923), and BORCHSENIUS (1957) with our fig. 21). Legs and antennae are shorter in *C. ceriferus*. Hind legs, 290—315 μ (KUWANA, and

BORCHSENIUS, loc. cit.), in *C. sumatrensis* 370—380 μ. Antennae (excluding basal segment) 173—178 μ, as against 240 μ in *C. sumatrensis*.

Type slides of *C. sumatrensis* in the Zoological Museum, Amsterdam, dry specimens in the Museum of Natural History, Leiden.

5. HEMASPIDOPROCTUS CINEREUS (GREEN, 1922)

In 1957 I received from Prof. Dr. P. BUCHNER two adult females, collected in June, 1957, by Mr. A. M. R. WEGNER, at the time, Director of the Zoological Museum at Bogor, in the botanical garden at Tjibodas. This garden, about 1450 m above sea-level, on the slope of Mt. Gedeh, is a branch of the Botanic Garden of Bogor, West Java, 27 km southeast of Bogor (formerly Buitenzorg). The insects were found under dry bark of a tree, *Altingia excelsa* Noronha, fam. Hamamelidaceae, about 1 m above the surface of the soil.

As the specimens from Tjibodas showed several minor differences from *H. cinereus* of Ceylon and South India, as described and figured in detail by MORRISON (1928, pp. 148—151), I thought that they represented a new species, closely allied to *H. cinereus*. However, after examining slides with specimens from Ceylon, South India, and Sumatra, I came to the conclusion that *H. cinereus* is a very variable species, as is already shown by GREEN's description (1922, pp. 450—453); and that it is not advisable to propose a new specific name for the specimens from Tjibodas. The adult female and first stage larva from this material are described below.

Adult female (♀ ad.)

H a b i t. The two specimens in alcohol have a thin coating of wax on the dorsal side with two parallel rows of tubercles along the margin. Seen from above the shape is ovoid with the largest width in the line of the hind coxae. In lateral view the shape is almost hemispherical. Dimensions of the two specimens about 10 $\times$ 10 and 8 $\times$ 6 mm; on the slide, after compression about 11 $\times$ 11 and 9.5 $\times$ 8 mm. The flat ventral side in the unprepared specimens showed two black areas, one around the rostrum, and a larger one behind the posterior legs which formed a cover or operculum above the sunken genital area with its eggs. This cover had a cordiform shape, and seemed to be hinged between the hind legs; dimensions of the black cover about 3 $\times$ 3 mm (fig. 29).

A n t e n n a e 11-segmented; length 1.7—1.9 mm (fig. 26). In the two examined specimens the membranous parts between the antennal segments occupy a rather large space; the total length of the brown sclerotized segments is 1.4—1.6 mm, or slightly more. The number of setae on different segments is as follows: I (basal segment) 6—8, II 15—16, III—X 12—15, XI 20—30. On segment XI 3—5 sensory setae could be recognized, on segments III—X sometimes one per segment, but they are usually difficult to distinguish from ordinary setae. The sensory setae are somewhat thicker in their basal part, and their top is not provided with a hair-like point (fig. 26).

L e g s with spine-like setae on the inner side of the tibia (fig. 27). Hind legs 2.8—3.0 mm; femur about 0.8, tibia 0.9—1.0, tarsus 0.5—0.6, claw 0.18—0.19

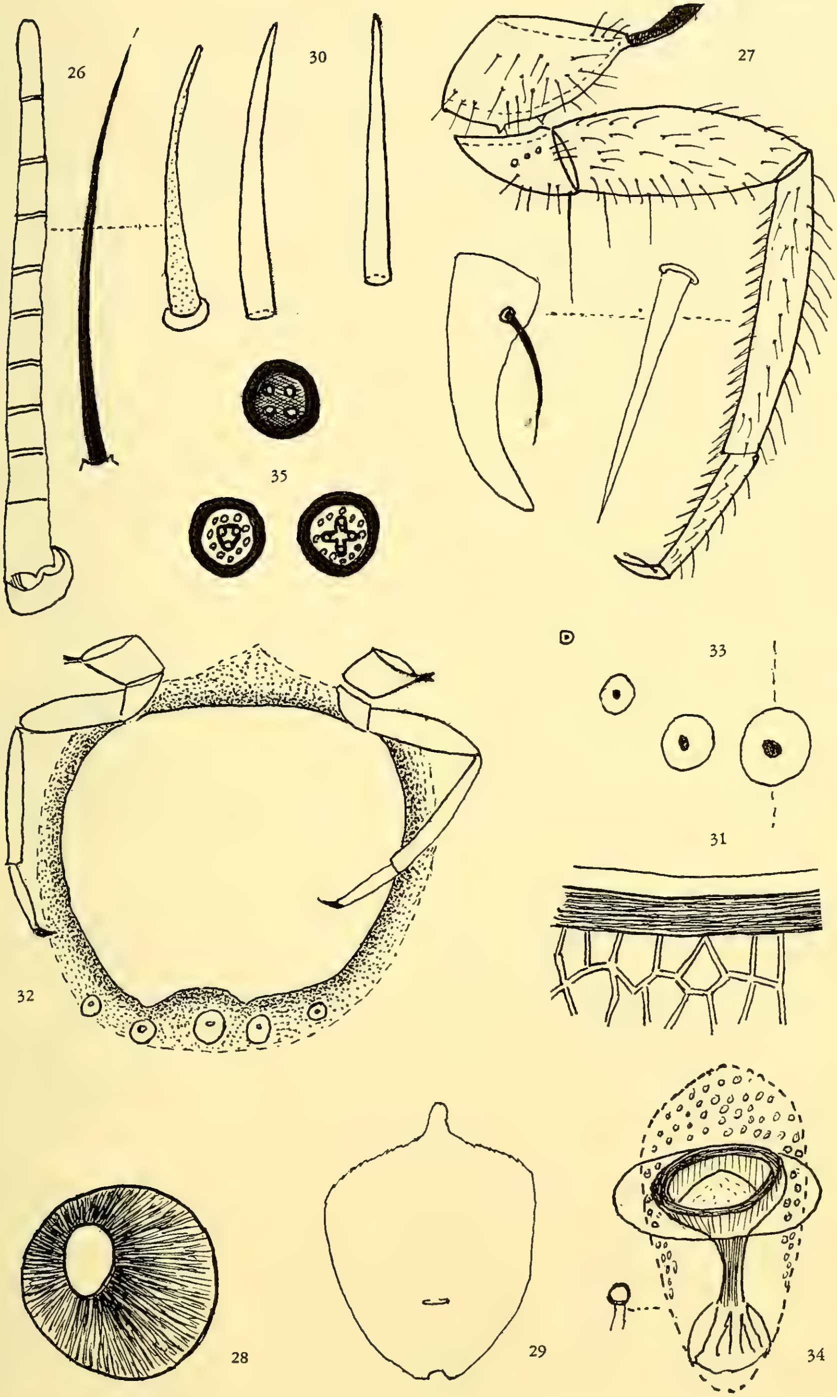
mm. The trochanter has 3—4 sensoria on both sides. The longest seta of the trochanter is about 0.40 mm; the two long setae at the base of the femur, inserted below that of the trochanter, are at most half as long (0.13—0.17 mm). Ungual digitules shorter than the claw (fig. 27).

Labium (rostrum) one-segmented, with about 30 setae, all sharply pointed. The rostral loop reaches about the line of the hind coxae. Eyes well-developed, conical (fig. 28); diameter of base ca. 130 μ.

Dorsal surface densely covered with spines (fig. 30) which are about 60 μ, and very few setae (ca. 150 μ). Along the sides of the body these spines are more or less arranged in groups, in which the spines point to a common centre. The double row of wax tubercles, observed in the unprepared specimens, is probably produced by these spine groups. The anal opening is surrounded by about 50 long setae (300—400 μ), and a broad ring of crowded wax pores. Diameter of these pores about 10 μ, mutual distance 1—2 $\times$ diameter, sometimes less. Most of these wax pores have a central triangle or ellips, surrounded by 10—12 loculi. The anal tube has at its inner end a double ring of polygonal cells (fig. 31); width of anal tube between these cells about 170 μ. Outside the anal area the wax pores usually show a central triangle with 3 loculi, surrounded by 10—12, sometimes 16 other loculi. In some pores the central figure has the shape of a cross with 4 loculi; this figure has seldom the form of a pentagon or a hexagon.

Ventral surface with spines and a few setae along the margin, similar to those on the dorsum (fig. 30). The medioventral region is provided with setae (130—150 μ long), but between the middle and hind legs spines prevail. Around the rostrum crowded setae and numerous wax pores are situated. Between these setae some black matter was still present, as visible in unprepared specimens. The area around the genital opening shows again crowded setae and wax pores. These pores have a triangular, cross-shaped, or pentagonal centre, surrounded by small loculi. The crowded pores around the rostrum are quadrilocular and heavily sclerotized, which applies also to the ovisac band. The ovisac band with its crowded wax pores, and few setae, is distinctly developed (fig. 32). Width of this band about 300—350 μ; distance of wax pores 1—2 $\times$ their diameter (ca. 10 μ), sometimes less. The ovisac band forms a black waxy operculum (fig. 29) over the genital area; the central part of the operculum is possibly produced by the crowded wax pores around the genital opening. MORRISON (1928) calls this structure of a

Fig. 26—35. *Hemaspidoproctus cinereus* (Green), adult females. 26, outline of antenna ($\times$ 45); separate figs.: a. common seta (left) and a sensory seta from the apical segment ($\times$ 640); 27, hind leg ($\times$ 45); separate figs.: spine from interior side of tibia ($\times$ 640) and claw with digitulus ($\times$ 200); 28, eye ($\times$ 200); 29, operculum on genital area ($\times$ 10); cf. fig. 32; 30, two spines from margin of body ($\times$ 640); 31, polygonal cells at inner end of anal tube ($\times$ 640); 32, ovisac band with crowded quadrilocular pores ($\times$ 18); inner margin sharply defined, but outer margin (indicated by a broken line) is not; sunken genital area within ovisac band, in which the eggs are deposited, covered by an operculum (fig. 29 and 35); 33, median circulus and 3 lateral circuli ($\times$ 45); the broken line indicates the middle line of the venter; 34, thoracic and abdominal spiracle ($\times$ 90); the broken line indicates the sunken area with wax pores in which the thoracic spiracle is situated; 35, wax pores ($\times$ 1000). A quadrilocular pore from the ovisac band (upper fig.), and two ventral pores from the thorax


26
30
27
35
33
31
32
28
29
34

sunken genital area, covered by a waxy operculum, half-marsupium. The area enclosed by the ovisac band is about 2.5 mm long and wide, so that the band runs at a considerable distance from the margin of the abdomen, and not along it, as in some other Monophlebinae. The operculum is about 3 mm long and wide, and consists of intertwined strands of parallel wax filaments, cemented by some dark substance. After removal of the operculum of the largest specimen more than 150 eggs were found in the sunken genital area.

Behind (or in) the ovisac band 5—7 well defined circuli are present, with a small sclerotized area in their centre (fig. 33). Diameter of the median circulus about 230 μ, of the lateral circuli 150, 100, and 50 μ, respectively. The smallest circulus of 50 μ is wanting in one of the two available females. Small reticulated areas ("organes grillagés" of VAYSSIÈRE, 1926) are numerous on the abdomen and thorax; they indicate muscle insertions (cf. REYNE, 1957, figs. 40—41) and cannot be confounded with the circuli in the present species.

Thoracic spiracles large, with a bar (fig. 34); width of peritreme 300—400 μ, of opening about half as much. The posterior spiracle is larger than the anterior one. No wax pores are found within the atrium of the spiracles, though these pores are crowded around the peritreme; the spiracle and surrounding pores are placed in a sunken area of the cuticle (fig. 34). Of the abdominal spiracles only few could be observed in the adult females; diameter about 30 μ, no pores within the atrium (fig. 34). As 7 pairs of abdominal spiracles are present in the first stage larva, the majority of them are apparently hidden in the adult females by the spines and folds of the mounted specimen. As mentioned above, the wax pores around the rostrum and those of the ovisac band are quadrilocular and heavily sclerotized (fig. 35). The dark coloured wax around the rostrum and in the genital area is apparently produced by these pores. The ventral wax pores outside the rostral and genital area have a triangular, elliptical or cross-shaped figure in the centre, surrounded by 10—12 small loculi (fig. 35).

First stage larva (larva I)

Several eggs, collected from the half-marsupium, contained full-grown embryos, ready to emerge. The following description is based on these embryos.

D i m e n s i o n s on slide from 1.6 × 0.9 to 1.7 × 1.0 mm.

A n t e n n a e 5-segmented (fig. 36), with swollen apical segment; length of antenna about 0.50 mm. On the apical segment 4 sensory setae are present, but it is rather difficult to distinguish them from the other setae which is also the case in the adult female. Number of setae on different segments: I (basal segment) 3—4 ?, II 6—7, III 6—8, IV 8, V 13—15 and 4 sensory setae.

L e g s about 0.90 mm long, but only the tarsus (fig. 37) is well-stretched, the other parts show a wrinkled outline. Tarsus (without claw) 250—280 μ, claw 60—65 μ. The claw-digitules are acutely pointed and reach the top of the claw; sometimes they are slightly longer and bluntly pointed. The inner side of the claw has a faint bend near the tip which forms a blunt denticle, but it is scarcely visible. Trochanter with 2 sensoria on both sides. Setae on inner side of tibia and tarsus spine-like as in the adult female (fig. 37). L a b i u m (rostrum) one-segmented with about 20 setae, among which the apical ones (so-called sensory setae) are

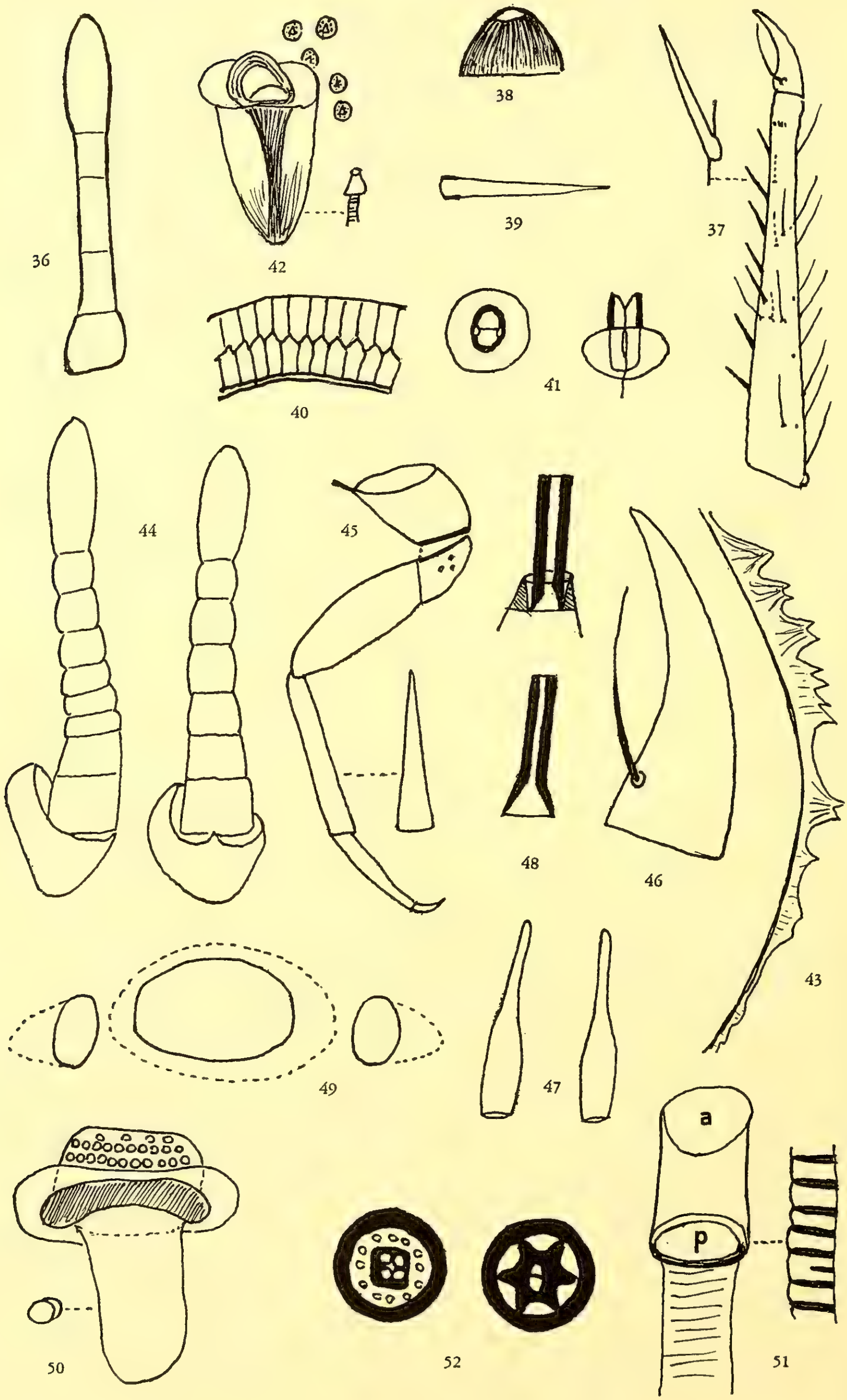
also sharply pointed. Length of labium and width at base about 200 μ. Eyes (fig. 38) already brown and sclerotized like the coiled mouth setae; diameter at base about 70 μ.

Dorsal surface. Several longer setae along the margin of the body; length 120—200 μ, on the head sometimes 300 μ. The 2 apical setae of the abdomen are always longer (500—550 μ) and stouter than the marginal setae. The general impression is that the apical setae of the abdomen are about twice as long as the marginal ones. In *Walkeriana floriger* (Walker, 1858) and *W. tosariensis* Reyne, 1957, long marginal setae are inserted opposite the marginal bilocular tubular pores (described below) which is not the case in the present species.

The abdomen along the middle line shows 2 series of setae (70—170 μ long) with 6—10 setae per segment. The 2 mediodorsal series of setae are flanked on both sides by a band of spines. These spines (fig. 39) are about 35 μ long, and are arranged in groups in which the spines are more or less pointing to a common centre. Six or seven of such groups, each with 20—40 spines, were found between metathorax and anal opening. The spine groups are not surrounded by a ring of wax pores as in *Walkeriana floriger* and *W. tosariensis.* Outside this spine band another series of setae is present with only 5—6 setae per segment. Outside this series, along the margin of the body, a second band of spines is present in which the spine-groups are less distinctly defined than in the mediodorsal spine bands. In conclusion it may be stated that the abdomen of the dorsal side is provided with 4 longitudinal series of spines, separated by 4 series of setae, of which 2 are located along the middle line. Thorax and head are mainly occupied by spines among which few setae are present. These spines are not arranged in groups as on the abdomen, but on the thorax in transversal bands; on the metathorax sometimes 5 or 6 indistinct spine groups could be recognized.

The anal opening is surrounded by a cluster of 20—30 setae, 160—200 μ long, and a ring of 15—20 wax pores. In the anal tube a double row of elongate cells (fig. 40) is clearly visible at the inner end; width of tube between these cells 40—45 μ. About halfway the tube 10—12 multilocular disc-pores are observed; these pores touch each other and are arranged in a single row. I failed to find the 8 short, bluntly pointed setae at the outer end of the anal tube, according to MORRISON (1928, fig. 74), present in the first stage larva of *Hemaspidoproctus* and other Monophlebini. As more than 20 embryos were examined, some showing the anal opening in a favourable position, it seems that these special setae are absent in the material at hand. The dorsal surface is scantily provided with wax pores which usually show a triangle in the centre, surrounded by 6—12 small loculi; the pores around the anal opening have an ellips in the centre. Remarkable are the large bilocular tubular pores (fig. 41) along the margin of the body (cf. MORRISON, 1928, figs. 71, 74, and 77, REYNE, 1957, fig. 4). About 40 of these pores were observed along each side of the body, usually in groups of 2—3 pores, but on the head, between the antennae, groups of 4—5 pores were present. These bilocular pores are wanting in the adult female.

Ventral surface. Spiracles of the thorax with a bar (fig. 42); no disc-pores within the atrium, but 4—5 near the peritreme; width of peritreme ca. 60 μ. The abdominal spiracles (along the dorsal margin of the abdomen) very



38
42
39
37
36
40
41
44
45
48
46
43
49
47
a
p
50
52
51

small, at most 5 μ; opening of spiracle and diameter of trachea about 2 μ (fig. 42). In one specimen 7 abdominal spiracles on one side of the abdomen, so that probably 7 pairs are present. A medioventral circulus, about 80 μ in diameter, near the end of the abdomen; sometimes a small sclerotized centre visible. Only few setae (70—80 μ) and wax pores are present on the ventral side. The wax pores have a triangle or ellips in the centre, surrounded by small loculi; cross-shaped central figures are rare.

A peculiar structure in some embryos is a serrated, sclerotized ridge between antennae and rostrum (fig. 43) which apparently serves to rupture the embryonic membranes when the larva emerges. As far as I could see this serrated ridge is not a part of the larval cuticle, but of one of the embryonic envelopes which are shed during emergence.

Discussion

The present specimens are assigned to the genus *Hemaspidoproctus* Morrison, 1927, on account of their half-marsupium, the 5—7 well-defined circuli, and the absence of disc pores within the atrium of the thoracic and abdominal spiracles (cf. MORRISON, 1928; key on p. 123, description and figs. of type-species on pp. 148—151).

It seems that at present only one species of *Hemaspidoproctus* is known. GREEN (1922) described next to *H. cinereus* a second species, *H. euphorbiae,* but doubts whether it is valid as it differs from *H. cinereus* only in colour and dimensions. The dimensions of mature specimens of the female *H. cinereus* are very variable; the smallest specimens are about half as large as the largest. GREEN (1922) also mentions a variety of *H. cinereus* with closely set spines, setae and wax pores, which may be distinct from *H. cinereus.*

By courtesy of the Commonwealth Institute of Entomology in London I examined slides with *H. cinereus* of Coimbatore (South India), Kandy and Delft (Ceylon), and of Fort de Kock (Sumatra). Only one slide, with specimens from Sumatra, contained larvae, viz., one larva of the first and four larvae of the second stage.

Fig. 36—43. *Hemaspidoproctus cinereus* (Green), first stage larva. 36, outline of antenna (× 90); 37, tarsus of hind leg (× 200); separate fig.: spine from inner side (×640); 38, eye (× 200); 39, dorsal spine from abdomen (× 640); 40, polygonal cells at inner end of anal tube (× 800); 41, marginal bilocular tubular pore, seen from above (left fig.) and from the side (× 465); 42, thoracic spiracle (× 300); on the right, abdominal spiracle (× 640); 43, serrated chitinous ridge in a full-grown embryo, between antennae and rostrum (× 300).

Fig. 44—52. *Buchnericoccus javanus* gen. nov., spec. nov. Adult female. 44, outline of antenna (× 40); left, a 10-segmented antenna, and right, a 8-segmented one; 45, outline of hind leg (× 20); separate fig.: spine from inner side of tibia (× 300); 46, claw of hind leg (× 200); 47, dorsal spines from margin of abdomen (× 640); 48, bases of different setae (× 640); upper fig.: base of a large seta from anal area. Lower fig.: base of a normal dorsal seta; 49, the 3 circuli (× 65); only inner edge of rim is well-defined and drawn with a full line; 50, anterior spiracle with wax pores within atrium (× 90); separate fig.: abdominal spiracle (× 90); 51, anal tube (× 65), with anal opening (a), and ring of polygonal cells (p.); separate fig.: outer side of polygonal cells (× 430); 52, wax pores (× 1500); left, a pore from dorsum of thorax, right, one from midventer

The specimens from Sumatra have been collected in May, 1930, by Dr. E. JACOBSON, from twigs of *Saraca declinata* (fam. Leguminosae) at Fort de Kock, 900 m above sea-level; the insects were identified by GREEN (1930, p. 296).

After comparing the specimens from West Java with those on the above-mentioned slides I found that the antennae and hind legs are about 1.5 times as long as in the specimens of Ceylon and Sumatra. The antennae of the specimens from Java are distinctly 11-segmented, but in the specimen from South India a partial division of the 10th segment is visible, as was also shown by MORRISON (1928, fig. 73 L). The specimen from Kandy (Ceylon) has 9-segmented antennae with a partial division of the 6th segment, these antennae are only 1.0—1.1 mm long (as against 1.7—1.9 mm in the specimens from West Java). According to figures of GREEN (1922) and MORRISON (1928) the antennae of the specimens from Ceylon and South India are about 1.2 mm. In the specimens from Sumatra certainly 10 antennal segments are present, but a part of the top is missing; there is no indication of a partial division of the 6th segment.

The setae on the legs are also variable. In the Javanese and Sumatran specimens the inner side of the tibia shows spines, but in the specimen from South India these setae have a long, hair-like point, less pronounced in the specimens from Ceylon. The setae of the femur also show differences. Sometimes a very long seta is present near the base of the femur, similar to that on the trochanter. In other specimens this long seta on the femur is replaced by 2 smaller ones, at most half as long. Of the first stage larva only one specimen was available for comparison with those of West Java, viz., larva I from Sumatra. Its length was 1.4 mm (as against 1.6—1.7 in the specimens from Java which were still enveloped by embryonic membranes). According to GREEN (1922) the average length of young larvae is 1.12 mm. Spines and setae are very scarce in larva I from Sumatra, when compared with those of West Java. Only 36 marginal bilocular pores are present, as against about 80 in the Javanese specimens. GREEN's figures (1922, plate 189, figs. 5 and 6) show about 60—70 glassy filaments, produced by bilocular pores, in specimens from Ceylon. The only important difference observed in the Sumatran larva is that the 8 short, bluntly pointed setae at the outer end of the anal tube are well developed, while they seem to be absent in the larvae from West Java. The larva from Sumatra seems to be poorly developed. This is probably due to the fact that petioles and leaves of small twigs, on which these larvae have settled, die before the larvae reach the adult stage, as was observed by the collector (cf. GREEN, 1930).

On the whole *H. cinereus* seems to be a very variable species, as is already shown by GREEN's description (1922, pp. 450—453). The mature female varies in length from 7 to 14 mm. The antennae are 9—11-segmented, varying in length from 1.0 to 1.9 mm. The number of circuli is sometimes 3, sometimes 7, but usually 5. The diameter of the circuli varies considerably. This is also the case with the single circulus of larva I (Sumatra 33 μ, Java 80 μ, India and Ceylon, according to a figure of MORRISON, about 10 μ). In the first stage larva the number of bilocular pores seems to vary from about 40 to 80.

Male stages of the genus *Hemaspidoproctus* are not known.

6. BUCHNERICOCCUS JAVANUS gen. nov., spec. nov.

In 1955, during his residence in Java, Prof. Dr. P. BUCHNER collected an unknown Monophlebine coccid in the botanic garden at Tjibodas (see Chapter 5). The insects were found on the bark of an unidentified tree, near and largely under the soil level, and accompanied by ants. BUCHNER got the impression that the mature females deposit their eggs in the soil, and that the larvae feed on roots or base of the stem. Adult females and their 3 larval stages are available; male stages are wanting.

Buchnericoccus gen. nov.

Adult females, and their three larval stages, with disc-pores within the atrium of the thoracic spiracles, but without such pores in the abdominal spiracles. Antennae 8—10-segmented. Setae on the inner side of tibia and tarsus spine-like. Labium (rostrum) one-segmented, about as long as wide. Dorsum densely covered with short, bottle-shaped spines which are arranged in more or less definite groups. Three circuli in the adult female, and its larvae of the second and third stage. No ovisac band in the adult female.

First stage larva with 5-segmented antennae and one circulus. Marginal bilocular tubular pores wanting, also in the following stages. Dorsal spines of the same shape as in the adult female. Anal tube with a double row of polygonal cells at the inner end, and a single row of multilocular pores about half-way the tube.

Type-species, *B. javanus* sp.n.

The genus is named after Professor Dr. P. BUCHNER who collected the specimens, and to whom we are indebted for several important studies on the mycetome of scale insects.

Buchnericoccus javanus spec. nov.

Adult female

H a b i t. The dorsum shows longitudinal rows of wax processes on the abdomen and the posterior part of the thorax; on the head and the anterior part of the thorax the arrangement of these processes is irregular. In the available alcohol material the distribution of the wax processes is most distinct in the smaller larvae. Fig. 57 shows the distribution of wax on the dorsum of a second stage larva, but the irregularly distributed processes on the anterior part of the body have been omitted. Around the body margin 24—25 flat wax processes are present, but on the frontal part they were probably broken off. On the dorsum 3 longitudinal rows of transversal wax plates are conspicuous; these rows are separated by a longitudinal row of small wax tubercles (fig. 57). Sometimes a similar row seems to be present inside the marginal wax processes, as indicated by white spots, but in other specimens I failed to observe this row.

A n t e n n a e 8—10-segmented, length 1.40—1.60 mm (fig. 44). The number of setae on the different segments of the 10-segmented antenna as follows: I (basal segment) and II about 20, III 15, IV—VI 10—12, VII—IX 13—15, X ca. 30.

On the terminal segment some setae are as long as the segment itself (380 μ); on some other segments setae of 250 μ were observed. Sensory setae are difficult to recognize in the available specimens, but are conspicuous in the third stage larva which is described below.

Legs. Length of the hind legs (fig. 45) about 3.6—3.8 mm; femur 1.10, tibia 1.15, tarsus (without claw) 0.65, and claw 0.23 mm. The trochanter has 3 sensoria on both sides. The legs are provided with numerous setae. From 170—190 were counted on the hind legs of 2 specimens: coxa 40, trochanter 15—20, femur 60—70, tibia 40, tarsus 15—20. The setae on the inner side of the tibia and tarsus are spine-like (fig. 45). Claw digitules tapering to a fine point, and shorter than the claw (fig. 46).

Labium (rostrum) one-segmented, about as long as wide (0.60 mm); with about 30 longer setae, and 10 shorter ones at the tip, some of which are bluntly pointed (so-called sensory setae). Near the longitudinal slit of the labium, closer to base than tip, an initial transverse sclerotization is present (also in the larvae) which seems to indicate that the labium has a tendency to become bipartite. No special importance has been attached to this indistinct character. The rostral loop reaches halfway the abdomen, and is about 5 mm.

Eyes large, sclerotized; base 170 μ, height 100 μ.

Dorsal surface densely covered with short, bottle-shaped spines (fig. 47); length 40—50 μ. The spines are arranged in rather definite groups, especially on the abdomen. Between these spine-groups setae of different length are inserted; the longer setae (200—300 μ) usually have a collared base which is wanting in the shorter setae (50—150 μ); see fig. 48.

In comparison with the densely crowded spines wax pores are scanty on the dorsum, also in comparison with the ventral pores. I suppose that the dorsal spines secrete wax so that wax pores are not needed on the dorsal surface, but could not study this point more closely. Professor BUCHNER has kindly examined for me his transverse sections. Some dorsal spines were connected with 1—2 glandular cells, but in other spines no connection with glandular tissue was found. Separate glandular cells, not connected with the dorsal spines, were also present. The wax pores are scattered among the setae between the spine groups; only very few are observed among the spines themselves. Most dorsal pores have a square figure with 4 loculi in their centre which is surrounded by about 12 additional loculi (fig. 52). The pores of the anal region usually have a triangular, round, or elliptical figure in their centre. Pores with a pentagonal or hexagonal figure in the centre are rare.

The anal opening is surrounded by long setae (400 μ) and by wax pores, more crowded than elsewhere on the abdomen. The anal tube is about as long as wide (0.22 mm), and has one row of polygonal cells at the inner end. The outside of these cells is shown in fig. 51. The inner side of the polygonal cells probably shows a reticulation as observed in the third stage larvae (cf. fig. 59), but in my preparations not distinct. Sometimes the ring of polygonal cells seems to be slightly thicker on the ventral than on the dorsal side.

Ventral surface with crowded setae and wax pores, but an ovisac band is lacking. Average diameter of the pores about 10 μ (variation 8—12 μ); intervening space of pores 10—50 μ, usually 30—50 μ. Length of ventral setae

100—150 μ, intervening space 30—80 μ. Very few collared setae are present, principally along the margin of the body; the majority of the setae have no collared base (cf. fig. 48). The wax pores on the head and thorax usually have a triangular or square figure in the centre, with 3—4 loculi; this figure is surrounded by 8—12 additional loculi (cf. fig. 52). A hexagonal figure in the centre with 6 loculi is occasionally present. The pores on the abdomen show a different structure. In the median region stellate pores with 6 (sometimes 7) radii prevail (fig. 52). Outside the median region the wax pores show a large circular figure in the centre, surrounded by 8—10 loculi.

Behind the genital opening (a transversal fissure) 3 well-defined circuli are present (fig. 49). Diameter of the middle circulus about 275 μ, of the lateral ones 130 μ.

The thoracic spiracles are large, and have 20—25 wax pores within their atrium (fig. 50); diameter of peritreme about 350 μ. In one of the adult females 7 abdominal spiracles were observed on one side of the abdomen, and 6 on the other side. Apparently 7 pairs are present, as was also observed in a second stage larva. The abdominal spiracles are located on the dorsal margin of the abdomen, between the spine groups. Diameter of these spiracles 30—45 μ; average of 10 spiracles 38 μ. No wax pores are present within the abdominal spiracles (fig. 50).

First stage larva (larva I)

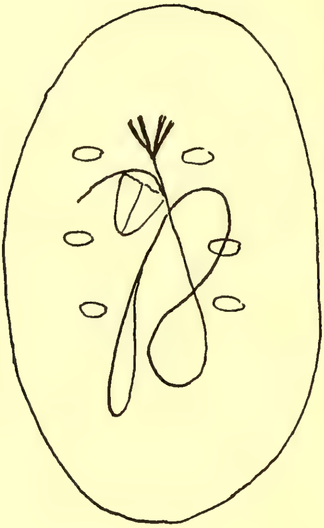
Available two specimens; dimensions on slide 1.6—1.7 × 1.0 mm.

Antennae 5-segmented, 0.45—0.50 mm long (fig. 54). With rather long setae, some as long as the apical segment. Number of setae on different segments: I (basal segment) 8, II 8, III 8—9, IV 5, V about 25, among which 3—4 sensory setae can be recognized.

Hind legs about 0.9 mm long; femur 250, tibia 270, tarsus 200, and claw 70 μ. Claw digitules about as long as the claw, acutely pointed. The legs are provided with about 100 slender spine-like setae; coxa 12, trochanter 8, femur 30, tibia 30, and tarsus 20 setae. On the trochanter 2 sensoria on both sides, which applies also to the second and third stage larvae. At the base of the tarsus another sensorium, also present in the other stages of the female.

Labium one-segmented, about as long as wide (200—220 μ). With 24 longer setae, and 8 shorter ones at the tip, of which 4 are bluntly pointed (so-called sensory setae). Rostral loop very long, 2.0—2.3 mm, coiled (fig. 53). Eyes sclerotized, base about 80 μ.

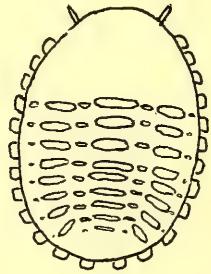
Dorsal surface with numerous short, pointed spines (fig. 55) of the same shape as in the adult female; length about 40 μ. The spines are arranged in 9—10 transversal bands on abdomen and thorax. Longitudinal rows of spine groups (5—6?) are vaguely visible on the abdomen; along the margin of the body they are best defined. Among the spines several long setae (150—250 μ) are present; a few setae on frons and apex of abdomen reach 300 μ. At the apex of the abdomen 2 robust setae are present, longer than 300 μ, but broken in my specimens; their length was probably about 400 μ. Two types of setae are present, with and without a collared base (fig. 55). Most setae are inserted outside the spine groups, but a distinct separation of spine and setae groups is not visible.



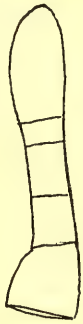
53

56

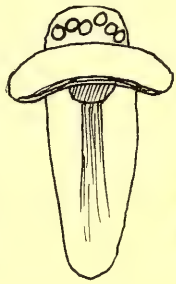
59



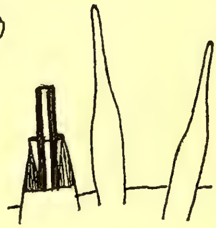
57



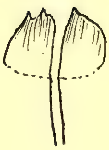
54



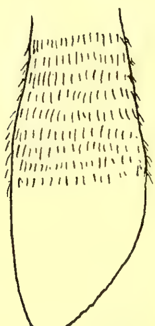
58



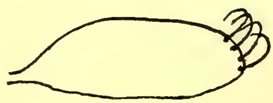
55



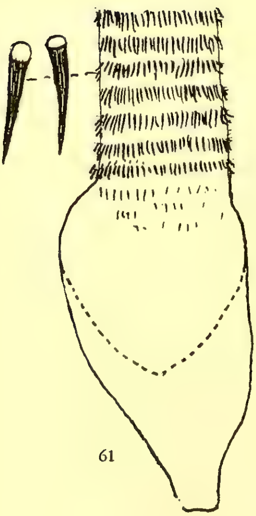
60



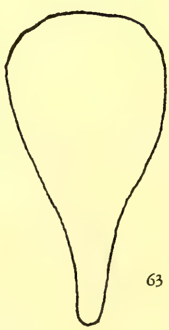
62



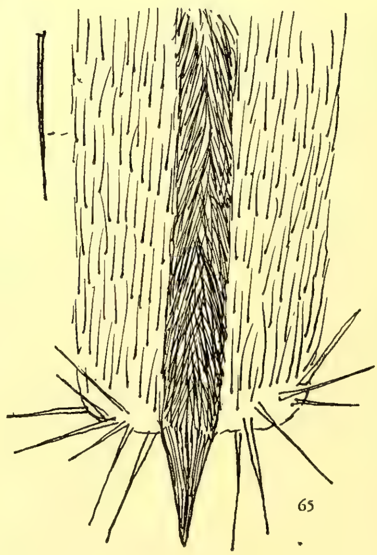
64



61



63



65

Anal tube (fig. 56) with a double row of polygonal cells at the inner end, and 10—12 multilocular pores, arranged in a single row, about halfway the tube. The 8 short, bluntly pointed, sometimes fimbriated setae at the outer end of the anal tube, as present in some other genera of the Monophlebinae, are wanting. The anal opening is surrounded by a cluster of about 20 setae of variable length (100—200 μ).

Only few wax pores are present on the dorsum; they have a triangular, sometimes round, elliptical, or square figure in the centre, surrounded by 9—12 loculi. Marginal, bilocular, tubular pores, as mentioned in chapter 5, are certainly absent, which applies also to the following stages.

Ventral surface with many setae of 100—200 μ. The wax pores are more numerous than on the dorsum, but of the same type. One medioventral circulus present; diameter 50—60 μ. As far as could be observed, the thoracic spiracles have 1—3 disc pores within their atrium. The abdominal spiracles could not be located with certainty; these minute structures (sometimes smaller than the wax pores) are difficult to discover, when their tracheae are not visible, and when there are many spines or setae along the margin of the abdomen. In the larvae of the second and third stage abdominal spiracles are certainly present.

Second stage larva of the female (larva II)

Available 2 specimens; dimensions on slide 5.0 × 3.5 mm. Antenna 6-segmented, 0.70—0.80 mm long, with 4 sensory setae on the apical segment. Hind leg about 1.5 mm long; femur 450, tibia 460, tarsus 260—300, and claw 110 μ long. Labium one-segmented, about as long as wide at base (300 μ), with about 12 short setae at the tip, some of which are bluntly pointed. Dorsal surface with numerous spines (40 μ), and setae (150—200 μ) of the same shape as in the other stages. A cluster of longer setae (150—300 μ) and a concentration of wax pores is present around the anal opening. The anal tube shows at the inner end a single row of polygonal cells which are reticulated on the inner side (cf. fig. 59), and provided at their proximal end with a chitinous ring. A row of multilocular pores, as observed in the first stage larva, is wanting in the following stages. Wax pores are scanty except around the anal opening. These

---

Fig. 53—59. *Buchnericoccus javanus* gen. nov., spec. nov. First stage larva. 53, coiled rostral loop (× 40); bases of legs, and outline of rostrum also figured; 54, outline of antenna (× 90); 55, dorsal spines and base of a collared seta on margin of head (× 640); 56, polygonal cells at inner end of anal tube; left, one of the 10—12 wax pores from half-way the anal tube (× 640); second stage larva of female; 57, wax processes on dorsum (× 8); processes on anterior part of body omitted, being damaged and partly missing; the sublateral series of small wax-tubercles only indicated by white dots; 58, anterior spiracle with 6(—8) wax pores within atrium (× 200); third stage female larva; 59, inner side of polygonal cells of anal tube (× 640).

Fig. 60—61. *Drosichoides haematoptera* (Cockerell), Adult male. 60, abdominal spiracle, lateral view (× 465); 61, apical part of protruded penis, ventral view (× 65); in separate fig.: two setae (× 465). Fig. 62—64. *Drosicha minor* n.sp. Adult male. 62, apical part of protruded penis, ventral view (× 65); 63, penis sheath, ventral view (× 90); 64, haltere (× 65). Fig. 65. *Monophlebulus toxopei* sp.n. Adult male. 65, apical part of protruded penis, dorsal view (× 300); separate seta (× 465)

pores have a triangular, or more often a square or round figure in the centre, surrounded by about a dozen loculi. Sometimes the central figure has the form of a pentagon. Only in few cases loculi were distinctly seen within the central figure, 2 in an elliptical, 3 in a triangular, and 4 in a square figure. The structure of the prevailing wax pores is about the same in all female stages. Ventral surface with many setae. The wax pores show the same structure as on the dorsum. The thoracic spiracles (fig. 58) have 6—8 wax pores within their atrium. In one specimen 7 abdominal spiracles could be observed on one side of the abdomen (diameter 12—15 μ); they have no pores within their atrium. Near the end of the abdomen 3 circuli are present; diameters about 50, 120—130, and 50 μ.

Third stage larva of female (larva III)

Two specimens are available. One specimen has 7-segmented antennae, but the fourth segment in one antenna shows an initial partition. This specimen measures 8.0 × 5.5 mm, and is ready to moult; coiled mouth setae and claws of the adult female are clearly visible. A second specimen, which measures only 5.0 × 3.0 mm, has 8-segmented antennae. At first I thought that this specimen was a male larva of the second stage, but closer inspection learned that it belongs to the third stage. As this larva is much shrunk, the following description is mainly based on the first mentioned specimen.

Antennae 7—8-segmented; length 0.90—1.00 mm. On the apical segment 4 sensory setae can be recognized, and on the other segments 1 or 2, excepting the 2 basal segments.

Hind legs about 2.5 mm long; femur 700, tibia 750, tarsus 450, and claw 165 μ. About 145 setae were counted on the hind leg (tarsus 20, tibia 40, femur 45, trochanter 15, coxa 25).

Dorsal surface with numerous spines (40—50 μ long) of the same shape as in the other stages. The spines on the abdomen and thorax are more or less arranged in bulging spine groups, separated by a few setae, 100—200 μ long. The longer setae usually have a collared base, and the shorter setae, which are more numerous, have no collared base. The anal region shows a cluster of long setae (300—400 μ), and a concentration of wax pores. The anal tube, which is about as long as wide, has a single row of polygonal cells at the inner end, but some cells are doubled. The cells have a reticulation (fig. 59) on the inner side as in the larvae of the second stage. The diameter of the anal tube between the polygonal cells in the different stages is about 220 μ in the adult female, 150 μ in larva III, 120 μ in larva II, and 60 μ in larva I. The wax pores are rather small (8—10 μ), and usually have a triangular or square figure in the centre, sometimes a circular, and less common a pentagonal or hexagonal figure. The central figure contains 3—6 loculi and is surrounded by 12—16 additional loculi.

Ventral surface with numerous short setae (70—160 μ) without collar; only a few collared setae are present along the margin. The dorsal spines partly overlap the ventrolateral margin. The thoracic spiracles have 12—14 wax pores within their atrium. Of the abdominal spiracles only one could be located with certainty; diameter 25 μ, no wax pores within atrium. Three circuli are present;

the middle circulus is the largest (diameter about 230 μ), the two lateral ones are smaller (ca. 130 μ). The wax pores are more numerous than on the dorsal surface, but of the same structure.

The 4 female stages can easily be separated by their antennae and legs. Larva I, 5-segmented antenna (0.50 mm). Length of femur + tibia + tarsus 0.7 mm. Claw 70 μ. Only one circulus. Larva II, 6-segmented antenna (0.70 mm). Femur + tibia + tarsus 1.2 mm, claw 110 μ; 3 circuli. Larva III, 7—8-segmented antennna (0.90—1.00 mm). Femur + tibia + tarsus 1.9 mm, claw 165 μ; 3 circuli. Adult female, 8—10-segmented antenna (1.4—1.6 mm). Femur + tibia + tarsus 2.9 mm, claw 230 μ; 3 circuli.

The present species can be recognized by the following characters. All female stages have the dorsum densely covered with short, pointed, bottle-shaped spines (figs. 47 and 55). They have disc pores within the atrium of the thoracic spiracles, but not in the abdominal spiracles. Larva I has a single median circulus, but the following stages have 3 circuli, of which the median is the largest.

Types of adult female and its 3 larval stages in the Zoological Museum at Amsterdam.

Discussion

According to the classification of MORRISON (1928) the present species belongs to the subfamily Monophlebinae, tribe Monophlebini, group 1; in this group marginal bilocular tubular pores are wanting in all stages.

MORRISON describes six genera of this group, viz., *Menophleboides* Morrison, 1927, *Palaeococcus* Cockerell, 1894, according to MORRISON, probably a synonym of *Menophleboides, Nietnera* Green, 1922, *Monophlebidus* Morrison, 1927, *Perissopneumon* Newstead, 1900, and *Pseudaspidoproctus* Morrison, 1927. After comparing the original descriptions and figures of *Perissopneumon* Newstead, 1900, and *Drosichiella* Morrison, 1927, I came to the conclusion that these genera are probably synonyms. As I found recently, RAO (1950) holds the same view.

The present species from Java cannot be assigned to any one of the above-mentioned genera; so I propose a new genus for it. This genus seems to be allied to *Nietnera* from Ceylon. *Nietnera* is the only genus, according to MORRISON (1928), which has disc pores in the atrium of the thoracic spiracles, but not in the spiracles of the abdomen. Further the dorsum of *Nietnera* in the adult female and larva I is densely covered with short spines which is also the case in our species from Java. The circuli of *Nietnera,* however, are quite different from those of the Javanese species, viz., 6 in larva I, and several minute circuli in the adult female. VAYSSIERE (1926, pp. 296—298) described *Aspidoproctus serrei* from Batavia (West Java). This species has about 20 wax pores in the atrium of the thoracic spiracles, but a description of the abdominal spiracles, and also of the circuli, is wanting. Groups of 3—6 large gland pores (25—30 μ in diameter according to VAYSSIERE's fig. 50, C), apparently bilocular tubular pores as described by MORRISON (1928), are certainly absent in our species from West Java. In the latter species the legs are much longer, the dorsal spines of another shape, and a slit-like marsupium is wanting, so that our species is certainly different from *A. serrei* VAYSSIERE.

The waxy secretion of *Buchnericoccus javanus* shows some resemblance to that of *Walkeriana compacta* (GREEN 1922; plate 185, fig. 1). As GREEN does not mention the occurrence of wax pores in the atrium of the thoracic spiracles, a character which he could scarcely have overlooked, it is pretty certain that *B. javanus* and *W. compacta* are not congeneric. The larvae of *W. compacta* are still unknown so that it is not known whether this species is provided with marginal bilocular tubular pores like the other *Walkeriana*, including the type-species, *W. floriger* (Walker, 1858).

Our present knowledge of the Monophlebinae is still very imperfect in spite of the elaborate studies of VAYSSIERE (1926) and MORRISON (1928). "La sous-famille des Monophlebinae a été toujours la terreur des coccidologistes" says VAYSSIERE. This statement is still true at the present day. MORRISON is of opinion that the extensive overlapping and intermingling of characters in these insects are an expression of a stage in the phylogenetic development which they have at present attained. To these statements may be added that the Monophlebinae are largely confined to the tropics and subtropics, and that the specimens are often found single or very few together. The existing collections, consequently, are very incomplete.

7. DROSICHA WALKER, 1858

Identification of species of the genus *Drosicha* Walker, 1858, is an arduous matter. Adult females and males, and also larvae are very difficult to separate (cf. MORRISON, 1928, p. 167—170). For a correct identification all stages of development are needed. KUWANA (1922) studied in detail the life-history of three *Drosicha* species in Japan, RAHMAN & LATIF (1945) that of *Drosicha stebbingi* (Green, 1902), in India. Our knowledge of other species is usually very incomplete. The life cycle of *Drosicha* species occupies a considerable time, so that a complete series of all stages can only be obtained by regular observation of the breeding places which is often difficult for non-residents. In several cases only males have been collected and described, while females of the same species (which certainly exist!) are not known, or are described under another specific name. Only by breeding adult males from the pupal cocoons will it be possible to decide whether a certain male and female belong to the same species. The males, of which the female is not known, were apparently caught on the wing, perhaps largely at lamp-light. RAHMAN & LATIF (1945) caught 272 males of *Drosicha stebbingi* with lanterns. In Dutch collections from Indonesia I have found about 100 males of Monophlebinae, but only a few females.

Agricultural entomologists in Indonesia (the former Netherlands Indies) have sometimes recorded *Drosicha* species from cultivated plants. KALSHOVEN (1950—51) mentions a large coccid (about 13 × 6.5 mm, according to his fig. 170), reported in 1915 by BERNARD from roots of the tea shrub. This insect, probably a *Drosicha* sp., was also found on other cultivated plants and on some wild trees. According to unpublished notes of Dr. KALSHOVEN, MENZEL in 1929 recorded a *Monophlebus* (*Drosicha* ?) among the pests of the tea shrub. Further BETREM in 1933 identified insects, found among the berries of coffee-trees in Central

and East Java, as *Drosicha* sp. In my collection there is a slide with a second stage larva of *Drosicha* sp., collected by Mr. F. W. RAPPARD on a cacao tree in Malang (East Java), and a slide with an adult female *Drosicha* from a tea estate near Garut (West Java), collected by Jhr. W. C. VAN HEURN.

Only four female *Drosicha* species were available for examination, of which two represent immature stages. They cannot be identified from the available literature, and it seems not advisable to describe them as new species, as only one stage is available. In the two adult females, first stage larvae and adult males are lacking, needed for a precise description. The four species are shortly described below under a-d in the hope that the stages which are not available will be collected in future.

(a) Adult females of a *Drosicha* sp. from the stems of *Casuarina montana* Miq., collected by Jhr. W. C. VAN HEURN in July, 1936 on Mt. Argapura (East Java), not far below the summit (3000 m). The insects were found singly on different stems at a height of about 1—1.5 m above soil level. A number of well-preserved specimens in alcohol is available in the Museum of Natural History, Leiden; the largest specimens have a length of about 15 mm. Three specimens were prepared. Dimensions on slide 10 $\times$ 6.5, 12 $\times$ 6.5, and 12 $\times$ 7 mm; shape of body elliptical. Antennae 8-segmented, length 2.0 mm. Rostrum 3-segmented, basal segment narrow; total length 0.6 mm. On the apical segment of the rostrum about 30 setae were found; about 10 are placed at the tip, some of which are bluntly pointed. Rostral loop ending between middle and hind legs. In the hind legs the femur is about 1.12, the tibia 1.12, the tarsus 0.65, and the claw 0.21 mm long. Base of sclerotized eye ca. 0.12 mm. Thoracic spiracles with a distinct bar, width of peritreme 0.23—0.27 mm. Width of abdominal spiracles 40—50 μ. Circuli distorted, only in two specimens vaguely visible. Wax pores all of about the same shape, like those figured by MORRISON (1928) in figs. 83 C and 84 F; the aspect of these pores changes somewhat with the depth of focussing. Width of anal opening 0.12—0.14 mm. The anal tube is short and sclerotized at the inner end, without polygonal cells (cf. MORRISON, 1928, fig. 83 E). The wax pores around the anal opening are somewhat different from the other pores; the central hexagonal figure is almost isodiametric (sometimes circular or elliptical) and surrounded by about 12 loculi.

Middorsal setae 40 μ, midventral setae 50—60 μ, so that according to MORRISON's key (1928, p. 169) *Drosicha townsendi* (Cockerell, 1905), and *D. stebbingii* (Stebbing, 1902) may be excluded. The first species is known from the Philippine Islands, and the second from India.

Professor BUCHNER is at present studying the mycetome of this species and several other Monophlebinae. I hope that his studies may contribute in some measure to the classification of this difficult subfamily.

(b) *Drosicha* sp. from the tea estate Ardjuno (near Garut, West Java). The available specimen, an adult female, was collected in 1932 by Jhr. W. C. VAN HEURN, but he cannot remember from what kind of plant the insect was taken. Dimensions of body 11 $\times$ 6 mm. As the body is parallel-sided the insect shows some resemblance to that, reported by BERNARD in 1915 from roots of tea shrub in West Java (cf. KALSHOVEN, 1950, fig.170). Antennae 8-segmented, length ca. 2.15 mm. In the hind legs the femur is 1.4, the tibia 1.5 and the tarsus 0.7 mm long;

claw 0.17—0.18 mm. Base of eye ca. 0.15 mm. Rostrum 3-segmented, length 0.60, width at base 0.40 mm. On the apical segment of the rostrum about 40 setae were observed, of which some at the tip were bluntly pointed. Width of peritreme in anterior thoracic spiracle 0.35, in posterior one 0.40 mm. Opening of abdominal spiracles about 30 μ, but widening inside to 60 μ; rings of trachea distinct. Width of anal opening 0.12—0.13 mm. The inner end of the short anal tube shows a U-shaped sclerotization, and a single row of polygonal cells which seem to be reticulated on the inner side. The 3 circuli are largely fused; width of this complex about 1.0 mm; dimensions of lateral circuli 0.20 $\times$ 0.35 mm (?). Genital opening almost round, width 0.6, length 0.4 mm. The wax pores resemble those of the *Casuarina*-species, but the central figure with its 6—8 radii is usually surrounded by 6—12 loculi. Length of middorsal setae 30—50 μ, of midventral setae 60—80 μ, so that *D. townsendi* and *D. stebbingii* may be excluded (see above). This species is certainly different from that of *Casuarina montana*, as is already shown by the shape of its body.

Dr. HAROLD MORRISON has examined my slides with the two abovementioned *Drosicha*-species in 1954, but he could not identify them with any of the species in the collections at Washington, D.C. He thought it to be fairly safe to describe them as new, if they could not be identified with species from India in the British Museum (in litt., 9. VIII.1954).

(c) *Drosicha* sp. from a cacao tree near Malang (East Java), collected by F. W. RAPPARD, 25.X.1951. Only one immature specimen is available, probably a second stage larva. Dimensions of body on slide 3.5 $\times$ 2.0 mm. Antennae 6-segmented, length 0.83 mm. In the hind legs the femur is 0.50 mm long, the tibia 0.60, and the tarsus 0.30 mm. Claw 70 μ; digitules reaching the tip of the claw, and pointed. Rostrum 3-segmented, length 0.3 mm, width at base 0.2 mm. The rostral loop reaches the line of the posterior coxae. Inner end of anal tube with a sclerotized ring, but without polygonal cells. Thoracic spiracles with distinct bar; width of peritreme 100—110 μ. Of the abdominal spiracles 7 could be located; opening ca. 13 μ. Circuli could not be seen. Dorsal wax pores like those of the *Casuarina* species. Middorsal setae on thorax 50—120 μ. The margin of the body is provided with at least 20 long collared setae, some of which reach a length of 600 μ.

(d) A species near *Drosicha*. On the roots of *Altingia excelsa*, in ants' nests, at Tapos, Mt. Gedeh (C. J. H. FRANSSEN, Aug. 1932), and on the roots of *Ficus annulata* in the district of Bandjar (L. G. E. KALSHOVEN, July, 1935); both in West Java. Dr. HAROLD MORRISON reported in 1941 about these insects: pretty certainly an undescribed genus and species. A larva from roots of the tea-shrub in West Java (Ch. BERNARD, July, 1915), available in the Bureau of Entomology at Washington, D.C., probably belonged to the same species. MORRISON stated that he needed adult males and larvae to place the insect precisely. These data are taken from unpublished notes of Dr. L. G. E. KALSHOVEN.

By the kind help of Miss LOUISE M. RUSSELL I could examine a slide of KALSHOVEN's specimen from the collection of the U.S. National Museum at Washington, D.C. (Nr. 3135). Dimensions 12 $\times$ 6 mm, sides of body almost parallel. It is an immature specimen, apparently a third stage larva (pre-adult), as the antennae

are 6—7-segmented, and only 0.65—0.75 mm long. Legs short and stout, with a long, slender claw. In the hind legs the femur measures about 0.50 × 0.14 mm, and the tibia 0.40 × 0.07 mm; the tarsus is about 0.27 mm long, and the claw 0.22 mm. Rostrum 3-segmented, 0.50 × 0.30 mm. Anal tube with a row of polygonal cells (reticulated on the inner side?) at the inner end. In the thoracic spiracles the width of the peritreme is 160 μ. The abdominal spiracles are conspicuous in this specimen; opening about 20 μ, widening inside to 40 μ. Remarkable are three winged apophyses medio-ventrally on the thorax; these are absent in the three above-mentioned species a—c. Circuli were not found. The dorsum is densely covered by short setae (ca. 25 μ); the setae at the sides of the body are longer, about 50—60 μ. The wax pores have a circular or elliptical opening in the centre which is probably surrounded by smaller loculi, but they were not visible in the specimen at hand. This species differs from the species a-c by its short, stout legs, and the medioventral apophyses on the thorax. Miss RUSSELL informed me that the specimen, collected at Tapos, Mt. Gedeh, by Dr. FRANSSEN, is also a pre-adult. I consider the examined specimen as a *Drosicha* sp., but this remains uncertain so long as the other stages remain unknown.

The *Drosicha* species are usually polyphagous, so that the foodplant does not point to the species. Of *D. stebbingi* (Green) more than 60 food-plants are known, and of *D. corpulentus* (Kuwana), more than 30. About a dozen *Drosicha* species have been described from the Oriental Region (often only the males), and four from the Palaearctic Region (Manchurian Subregion), but hitherto not a single species from Indonesia can be identified with certainty, though I got the impression that at least six or more species are represented in the available collection of females and males (see chapter 8).

8. MALES OF MONOPHLEBINAE

As already mentioned in chapter 7, about 100 males of Monophlebinae were found in Dutch collections of Indonesian insects. Apparently these insects were caught on the wing, perhaps largely at lamp light, though this is nowhere noted on the labels. RAHMAN & LATIF (1945) report that they caught 272 males of *Drosicha stebbingi* with lanterns. Dr. M. A. LIEFTINCK, who caught several males of Monophlebinae in Java, informed me that these males are attracted by lamp light, but that some species were caught in broad daylight, for example a species with red body which was taken from banana leaves. The male Monophlebinae are easily recognized by their dark, blackish wings, and one to six pairs of appendages (fleshy tassels) at the posterior end of the abdomen, so that they easily draw attention of collecting entomologists.

The females to which these males belong are nearly always unknown, though they certainly exist. In the few cases in which males and females can be assigned to the same species, the males were probably collected among the egg-mass or bred from the pupal cocoons. It is likely that in some cases male and female have been described as different species, when males are only represented by specimens caught on the wing.

The difficulty begins already with *Monophlebus atripennis* Burmeister, 1835,

the first species described in the subfamily Monophlebinae. Only the adult male of this species is known. It was collected in Java and described very superficially. This male was rather large (length of body about 7 mm) and had only one pair of caudal appendages (length 1 mm). MORRISON (1928, p. 144) is of opinion that this male from Java, which has never been definitely rediscovered, belongs to the *Walkeriana* group of the tribe Monophlebini. As far as I know, *Labioproctus polei* Green, 1922, is the only oriental species in this tribe, of which male and female are known (Cf. MORRISON, 1928, pp. 145—148). This species is reported from South India, Ceylon, and Java. The male is only 4 mm long, and the abdomen is not dark red, and without deep incisions, as described for *Monophlebus atripennis,* so that the male of *Labioproctus polei* cannot be identified with that of *M. atripennis.* Of the four *Walkeriana* species, described by GREEN (1922), not a single male is known. In *Walkeriana tosariensis* Reyne, 1957, males certainly exist, as among the dry material of this species pupal cocoons with prepupae and pupae were found (REYNE, 1957, pp. 127—129).

In the Museum of Natural History at Leiden some old pinned males are labelled *Monophlebus atripennis,* but this is certainly a misidentification. I have examined a specimen from Supajang (environment of Surabaja, East Java). The date of collection is not certain; the label reads 24/477 (= 24.4.1877?). As far as the dry specimen could be investigated the following description is drawn. Length of body 5 mm; thorax and abdomen broad, 2—3 mm. Length of wing about 6 mm, wing-span 15 mm. The abdomen is black and provided with 5 pairs of caudal appendages of which the apical are at least 1 mm long. A microscopical mount of a piece of broken antenna was made, probably segments III—VI. Segments 0.90—0.95 mm long, tri-nodose, with 3 distinct whorls of setae; in each whorl about 12—15 setae, 1.0—1.2 mm long. This male is probably a *Drosicha* species, as indicated by the number of caudal appendages and the venation of the wings.

In the collection of the Museum of Natural History at Leiden, and of the Zoological Museum at Bogor (Java) the males of Indonesian Monophlebinae are preserved dry, as pinned insects, so that only few characters can be examined. For a detailed study of scale insects, males as well as females, it is necessary to make microscopical mounts. When small, fragile insects are pinned, legs, antennae, wings and other appendages are often lost in the course of time. A more suitable way of preserving such insects dry is to enclose them in a small tube which can be pinned through the cork; in this case no parts can be lost. It is, however, difficult to make a good microscopical mount of these dry and shrivelled males, as they become very brittle and are easily broken during preparation. When wings, legs, and antennae are undamaged, a suitable mount can be obtained by soaking them during some days in phenolum liquefactum, after which they can be mounted on a slide. The best method of preserving for later mounting on slides is in alcohol with a small amount of glycerine or lactic acid, to prevent hardening.

The oldest collection is that in the Museum at Leiden. It contains specimens, collected in Java, Sumatra, Borneo, and Timor by SALOMON MÜLLER who died in 1864, so that these males are centenarians. Some specimens were collected by the expedition of Dr. A. W. NIEUWENHUIS to Borneo, in 1894, and some specimens by C. SCHAEFFER on the island of Wetar (near Timor), in 1898. In

the present century some specimens were collected in Java and Sumatra by Drs. JACOBSON, KOHLBRUGGE, KARNY, LIEFTINCK, and VAN DER VECHT.

Some of the oldest specimens in the collection at Leiden are labelled *Monophlebus* species. These identifications are probably based on the coloured plate 6 in WESTWOOD (1843). *M. atripennis* Burmeister, 1835, the type-species, was already mentioned above. There are several specimens of *M. burmeisteri* Westwood, 1843, from Timor, Java, Sumatra, and Borneo, collected by MÜLLER, and specimens from Java, collected by BLUME and PIEPERS. This species according to MORRISON (1928) is a *Drosicha* sp. If all these males from Java, Sumatra, Borneo, and Timor really belong to the same species, it must be widely distributed in Indonesia. As far as I am aware, the species *M. burmeisteri* Westwood has never been examined in detail after WESTWOOD's short note and his figure of 1843. In the collections at hand specimens with five pairs of caudal appendages, like *M. burmeisteri*, are present from East Java (Surabaja), Central Java (Rembang), South Sumatra (Benkulen), and Halmahera, but specimens with three pairs of caudal appendages are by far the most numerous.

In the Museum at Leiden there is also a species, labelled *Monophlebus raddoni* Westwood, 1843, collected by M. G. PIEPERS at Sindanglaja (West Java). This is certainly a misidentification, as *M. raddoni* has only been reported from the Gold Coast (Ghana) in West Africa. According to WESTWOOD's coloured figure (plate 6, fig. 3) *M. raddoni* has the same characteristic wing as *Drosichoides haematoptera* (Cockerell, 1919), though the caudal appendages are quite different. It is almost certain that PIEPERS has collected the latter species which is known from Tjisarua (M. A. LIEFTINCK, 1939), and Tjibodas (H. H. KARNY, 1923, M. A. LIEFTINCK, 1930). Sindanglaja, Tjisarua, and Tjibodas are situated on the slope of Mt. Gedeh (West Java) at altitudes of about 1100, 1200, and 1400 m, respectively. In the collection at Leiden *Drosichoides haematoptera* is also represented by specimens from Tosari (East Java), and Borneo (expedition A. W. NIEUWENHUIS, July 1894). The collection of Bogor contains specimens from West Java, viz., Mt. Gedeh and Mt. Tangkuban Prahu (coll. F. C. DRESCHER, 1937, 4000—5000 ft), and also a specimen from East Borneo (H. C. SIEBERS, 1925). According to COCKERELL (1919) the holotype was collected at Sandakan in British North Borneo. Though the males seem to be widely distributed in Borneo and Java, the female is still unknown.

The majority of the 53 males from Bogor seems to belong to the genus *Drosicha* Walker, 1858, which is also the case with the male Monophlebinae of the Museum at Leiden. It is a hopeless affair to identify or to describe these dry shrivelled males, as even in the few cases where all stages of a *Drosicha* species are known the separation of different species is difficult. I have made an exception for a species which at once draws the attention by its small size. It was collected in the Karimondjawa Islands, small islands in the Java Sea, (north of Semarang), in Nov., 1930, by Dr. M. A. LIEFTINCK, and on Enkhuizen Island (Pulu Njamuk Ketjil) in the bay of Batavia (Djakarta) by EDW. JACOBSON (Sept., 1907). Of the first lot, three specimens were prepared for microscopical examination, and one specimen of the second lot. It is described at the end of this paper as a new species, *Drosicha minor*. I suppose that it is the only *Drosicha* species living in

these small islands, so that confusion with other species may be excluded, and hope that the females will be found in future.

Only one species of the tribe Drosichini can be easily recognized, viz., *Drosichoides haematoptera* (Cockerell, 1919), by its wing pattern. The anterior vein and the costal area between this vein and the wing margin are red, but in old dry specimens this colour turns yellow or light brown (cf. MORRISON, 1928, plate 6, fig. B). In a microscopical mount of old dry wings granules of bright red pigment are sometimes visible in transmitted light; it appears that the pigment is most concentrated in the anterior vein. The specimens from Java, collected at altitudes of 1100—1700 m, show slight differences from the type-species and the other specimens from Borneo. Perhaps these latter specimens were collected in the lowland, but precise data on this point are wanting. Microscopical mounts were made of two specimens from Mt. Tangkuban Prahu, mentioned above, and of one specimen from Borneo; see discussion below.

The collection from Bogor contains also a dozen specimens from New Guinea striking by their small size, like our *Drosicha minor.* These specimens were collected by Dr. L. J. TOXOPEUS during the Third Archbold Expedition to New Guinea, 1938—1939. As far as examined, all specimens seem to belong to one or two closely allied species. Microscopical mounts show that they belong to the tribe Monophlebulini, untill present only known from Australia (cf. MORRISON, 1928, pp. 173—179). It is rather certain that our specimens belong to the genus *Monophlebulus* Cockerell, 1902, of which five species are known from non-tropical Australia (cf. H. & E. MORRISON, 1923). The specimens from New Guinea, collected at altitudes of 0—1800 m, and at 2100 m are described below as two new species.

It is remarkable that among about 100 males of Monophlebinae from Indonesia no specimens were found with only one pair of caudal appendages, as characteristic for the tribes Monophlebini and Iceryini, of which female specimens are known from Indonesia belonging to the genera *Labioproctus* Green, 1922, *Walkeriana* Signoret, 1875, *Hemaspidoproctus* Morrison, 1927, and *Icerya* Signoret, 1875. Perhaps the males of these genera are seldom seen in flight, or they may be scarce in comparison with the females. The majority of the 100 available males certainly belongs to the tribe Drosichini which are apparently often on the wing, so that they draw the attention of collecting entomologists. The best way to collect *Monophlebinae* is certainly to collect females during or shortly after oviposition. The first stage larvae can be bred from the eggs, and adult males from the pupal cocoons, if available.

Drosichoides haematoptera (Cockerell, 1919) ♂

COCKERELL (1915, p. 344) described the male of a remarkable Monophlebine coccid from Palawan Island, near the North point of Borneo, as *Llaveia sanguinea.* Afterwards he received two males from Sandakan in British North Borneo which he described as *Llaveia haematoptera* (cf. COCKERELL, 1919, p. 272). The latter species was chosen by MORRISON (1927, p. 106) as the type-species of a new genus, *Drosichoides.* Though the female is still unknown, the genus seems to

be valid on account of its remarkable wings and abdominal spiracles. The wings, marked by their red anterior vein and costal area, were already mentioned above. The posterior vein is slightly longer than the anterior and curved forward, so that it almost reaches the top of the white line (a hyaline fold) between the two veins (cf. MORRISON, 1928, fig. 87 G). The abdominal spiracles of *Drosichoides* are more or less sclerotized and slit-like, with some minute denticles along the margin (fig. 60). This structure has not yet been observed in other Monophlebinae. My three prepared specimens (from East Borneo, and Mt. Tangkuban Prahu, in Java) show slight differences from the type-species, as described and figured by MORRISON (1928, pp. 171—172). There is also some difference between my specimens from Java and Borneo. The type-species was probably collected in the lowland, as Sandakan is a coastal town. My specimens from Java were collected at 1100—1700 m.

According to MORRISON (1928, fig. 88 A) the caudal appendages in the type-species are about 4.0, 3.2, and 2.5 mm long; COCKERELL (1919) says that the apical appendages are about 3.5 mm. In my specimen from Borneo the length of the caudal appendages is about 2.6, 2.2, and 1.8 mm, and in those from W. Java only 1.6, 1.2, and 0.45 mm. The range of variation in the length of these appendages is unknown, as in each locality only 1—4 specimens were collected.

There seems to exist some difference in shape of the point of the penis sheath, though shape and dimensions of the sheath are similar. In my specimen from Borneo this point is narrower than in MORRISON's fig. 88 D. of the type-species, and in the specimens from Java the point is still narrower. As long as the adult females and the larvae are unknown, I am inclined to assign our specimens from Borneo and Java to the type-species *Drosichoides haematoptera*. MORRISON (1928) saw no structural differences in the dry type-specimens of *D. haematoptera* and *D. sanguinea*; only a difference in size of body and colour of the thorax was observed. Dry specimens of *D. haematoptera* can easily be recognized by their wings; antennae, abdomen and caudal appendages show the same colour as the costal area in the wings, viz., yellow to light brown.

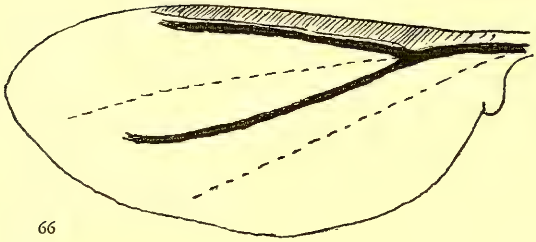
If *Monophlebus raddoni* Westwood, 1843, from West Africa also belongs to the genus *Drosichoides*, as seems acceptable on account of its wings, it certainly belongs to another species than *D. haematoptera*, as is shown by six pairs of very short caudal appendages (cf. WESTWOOD, 1843, pl. 6, fig. 3).

In one of my mounts the penis is protruded (fig. 61). Its apical part is different from that of the penis in *Monophlebulus toxopei* spec. nov. (fig. 65), but similar to that of *Drosicha minor* spec. nov. (fig. 62). When this organ is not protruded, as is usually the case, its shape cannot be examined.

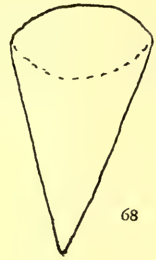
Drosicha minor spec. nov. (♂)

As mentioned above, this species was collected in the Karimondjawa Islands and in an island in the Bay of Batavia. Three specimens of the first series were prepared for microscopical examination, and one of the second series.

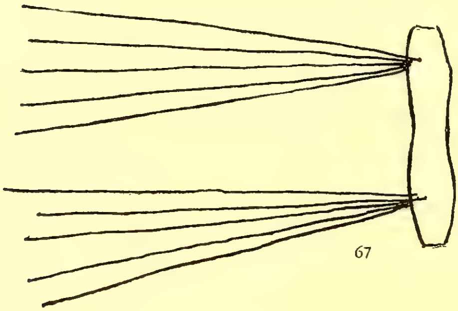
Length of body about 4 mm. Length of the 3 pairs of caudal appendages 1.7, 1.4—1.5, and 0.5—0.6 mm. As usual the apical appendages are the longest, and



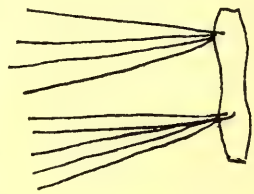
66



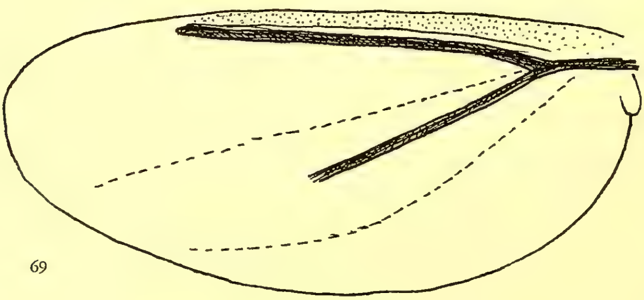
68



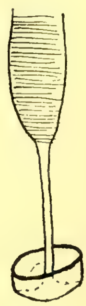
67



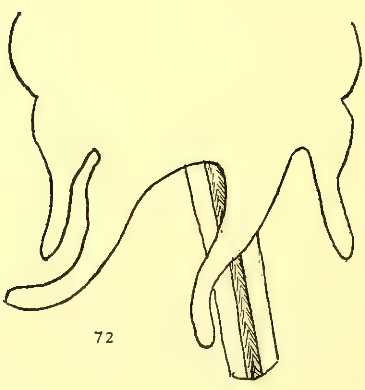
71



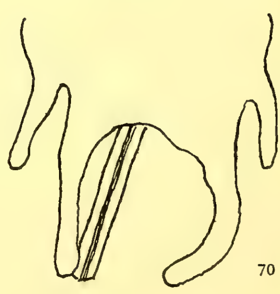
69



73



72



70

the following ones of diminishing length. The apical appendages are as long as the abdomen which has a length of about 1.5 mm.

Length of wings about 4 mm or slightly less. These wings are greyish brown and almost translucent, but the costal area is of a darker colour. The wing-venation is shown in fig. 66. The haltere is 0.35—0.45 mm long and provided with 4—5 curved setae at its top which are hooked on a small pocket at the base of the wing (fig. 64).

The 10-segmented antennae have a length of about 4.5 mm. The antennal segments III—X are tri-nodose, and provided with three distinct whorls of setae; this feature is sometimes less distinct in the two apical segments. Length of segment III 0.50—0.60 mm, and of its setae 0.40—0.50 mm; there are usually 12—15 setae in each whorl.

In the hind legs the femur is 0.7—0.8 mm long, the tibia 1.0—1.2 mm, and the tarsus 0.45—0.55 mm. The claw has a length of 100 μ or slightly more, and is provided with two rather long digitules which almost reach the tip of the claw, but are not knobbed. The trochanter has 3—4 sensoria on each side. A number of bifurcate setae is present on the anterior femora, as is also mentioned by MORRISON (1928, p. 165) in his diagnosis of the male *Drosicha.* Remarkable is a small triangular sclerite at the base of the tarsus, so that it seems to be 2-segmented. This character was also observed in other mounts where the legs were well cleared. According to MORRISON (1928, p. 29) it is a normal feature in the legs of male Monophlebinae.

The penis sheath measures about 0.47 $\times$ 0.25 mm. It is somewhat constricted in the apical portion (fig. 63), as seems to be characteristic for the genus *Drosicha* (cf. MORRISON, 1928, fig. 85 B, and KUWANA, 1922, fig. 65). In one specimen the penis is protruded; it has the same shape as in *Drosichoides*, but its setae are different (fig. 62).

The largest diameter of the compound eye is 0.30 mm, and of the facets 20—25 μ. The peritreme of the thoracic spiracles has a diameter of 0.15 mm. The abdominal spiracles could not be located, though in two specimens the sides of the abdomen were well cleared; these spiracles are probably very small, not larger than the wax pores.

In the collection from Bogor four other males are present with only slightly infuscated wings, and almost without a wavy pattern, as observed in species with dark wings. These males were collected at Tjibodas (alt. 1400 m) in West Java

Fig. 66. *Drosicha minor* sp.n. Adult male. Wing ($\times$ 18); veins black, dark costal area shaded; two white lines (hyaline folds) shown by a broken line. At the base of wing a small pocket visible, where curved setae of haltere (cf. fig. 64) are hooked. Fig. 67—70. *Monophlebulus toxopei* sp.n. Adult male. 67, third antennal segment ($\times$ 65), with two whorls of setae (drawn only on the left side); 68, penis sheath, ventral view ($\times$ 90); 69, wing ($\times$ 18), dark costal area dotted; cf. explanation fig. 66; 70, apex of abdomen with two pairs of appendages and protruded penis (cf. fig. 65); outline, dorsal view ($\times$ 45). Fig. 71—73. *Monophlebulus montanus* sp.n. Adult male. 71, third antennal segment ($\times$ 65), with two whorls of setae (drawn only on the left side); cf. fig. 67. 72, apex of abdomen ($\times$ 65), with two pairs of appendages and protruded penis; 73. penultimate abdominal spiracle with trachea, lateral view ($\times$ 435)

by Dr. H. H. KARNY, in 1923. The wings are about 6 mm long, and the antennae 6.5 mm, so that these parts are almost 1.5 times as long as in *D. minor*; the legs are only slightly longer. Further the dorsum of the Tjibodas species is densely clothed with long setae (250—350 μ), except the thorax. In *D. minor* setae are scarce on the dorsum, and only numerous along the sides of the abdomen (length 200—250 μ). For the rest dimensions, shape of body, caudal appendages, halteres, and penis sheath show no essential differences from *D. minor*, so that both species seem to be closely allied. Their position can only be clarified after adult females and larvae have been collected.

Monophlebulus toxopei which is described below resembles *D. minor* by its small size and semi-translucent wings, but the bi-nodosity of the antennae shows immediately the difference.

Types of *Drosicha minor* spec. nov. are preserved in the Zoological Museum at Amsterdam.

Monophlebulus

During the Third Archbold Expedition to New Guinea 1938—1939 eleven males of Monophlebinae were collected by the late Dr. L. J. TOXOPEUS in a mountainous region south of the Idenburg River, an affluent of the Mamberamo or Rochussen River. This region is situated about 200 km S. E. of Hollandia (Kota Baru). One specimen was collected in Araucaria Camp (alt. 800 m; weather rainy and often stormy), three specimens were caught in Mist Camp (alt. 1800 m; dense, very damp forest), and seven specimens were collected in Top Camp (alt. 2100 m; on a sparsely overgrown summit; weather less cloudy than in Mist Camp). The specimens from Mist and Top Camp were collected in Jan., 1939, and that from Araucaria Camp, in March, 1939. Further there is one specimen from Hollandia, on the sea-coast, collected in July, 1938; this specimen seems to belong to the same species as those from Araucaria and Mist Camp.

Seven specimens were mounted on slides; five other were examined unmounted. In the 10-segmented antennae the segments III—X are bi-nodose, and provided with two whorls of long setae. Undamaged specimens have usually two pairs of caudal appendages. From these characters it is evident that the males of New Guinea belong to the tribe Monophlebulini, at present only known from non-tropical Australia. This tribe contains two genera, *Monophlebulus* Cockerell, 1902, and *Nodulicoccus* Morrison, 1923. Unfortunately the male of *Nodulicoccus* is not known. Of *Monophlebulus* five species have been described, but of *Nodulicoccus* only one. As far as known the females live on *Eucalyptus*. The males from New Guinea are very similar to those of *Monophlebulus crawfordi* (Maskell, 1888), as described and figured by MORRISON (1928), so that I have accepted that our males belong to the genus *Monophlebulus*. As in all species, of which only males are known, there remains some uncertainty in this identification.

The specimens from Hollandia, Araucaria Camp and Mist Camp belong to the same species described below. The specimens from Top Camp have much smaller antennae and legs, as is already visible with a pocket-lens, so that I believe that

they belong to another species, though closely allied; this is the second new species described here.

Monophlebulus toxopei spec. nov. ♂

Length of body 3.0—3.5 mm; abdomen 1.2—1.4 × 0.8—0.9 mm (on slide). As far as could be examined in the dry specimens the head and the compound eyes are red. The abdomen is greyish red, probably on account of a slight deposit of wax; sometimes the whole abdomen is covered by a white layer of wax. The abdomen is only slightly sclerotized in comparison with the rest of the body. The sides of the abdominal segments are protruding, and provided with many setae which are scarce in the middorsal region.

Two pairs of caudal appendages are present on the last abdominal segments (fig. 70). The apical appendages have a length of 0.40—0.60 mm, and the other pair of 0.30—0.35 mm. These appendages are provided with 3—7 long setae at the top which may reach a length of 0.30—0.40 mm. In other specimens only the two apical appendages are present; it seems that in this case the penultimate ones are not developed.

Compound eyes protruding, crimson; largest diameter 0.25—0.30 mm; facets 20 μ or slightly more. The transparent part of the ocelli has a diameter of about 40 μ.

Antennae 10-segmented, length 4.0 mm. In one complete antenna the length of the different segments was as follows: I (basal segment) 0.15, II 0.23, III 0.50, IV 0.47, V 0.45, VI 0.42, VII 0.42, VIII 0.44, IX 0.43, and X 0.53 mm; total length 4.04 mm. In two other specimens, in which only the five basal segments were present, the length of the broken antenna was 1.73 and 1.78 mm; in the complete antenna segments I—V have a length of 1.80 mm. The antennal segments III—X are bi-nodose and provided with two whorls of long setae. In the third segment which is about 0.50 mm long, each whorl has 10—15 setae with a length of 0.70—0.80 mm (fig. 67).

In the hind legs the femur is 0.70—0.75 mm long, the tibia 0.95—1.00 mm, and the tarsus 0.50—0.55 mm; total length of these three parts in four specimens 2.15—2.25 mm. The claw is about 100 μ long; its digitules are pointed and short, at most half as long as the claw. The trochanter has 4—5 sensoria on each side. Tibia and tarsus are provided with spine-like setae on the inner side; some of these spines are bifurcate.

Length of wings 4.0—4.5 mm, width 1.8—2.0 mm. The wings are more or less translucent, but the costal area is darker coloured; this area is separated by a narrow, almost hyaline strip from the anterior vein. The posterior vein is short, at most half as long as the wing (fig. 69). The haltere is 0.37—0.40 mm long, and provided with 2—3 large curved setae at its top. These setae, which are hooked into a small pocket at the base of the wing, end in a long acute point which is faintly knobbed.

The ventral penis sheath has the shape of an isosceles triangle with a rounded base (fig. 68); length about 0.40 mm, width at base 0.20 mm. The apical part of

the penis has a different shape from that in *Drosicha* and *Drosichoides* (fig. 65)*).

The abdominal spiracles are difficult to find. In one specimen four of these could be located on one side, and two on the other side; diameter 20—25 μ. It seems that only the posterior abdominal spiracles are well developed, and the anterior ones but poorly which is also the case in *Monophlebulus crawfordi* (cf. MORRISON, 1928). The peritreme of the thoracic spiracles has a diameter of about 120 μ.

Wax pores are numerous along the sides of the abdomen. They have a square shape, and are quadrilocular. Some of these pores are also observed on the caudal appendages which are protrusions of the posterior abdominal segments.

Monophlebulus montanus spec. nov. ♂

This species, of which seven specimens were collected in Top Camp (2100 m), differs from *M. toxopei* by much shorter antennae, and shorter legs. Body and wings are only slightly smaller. For the rest no essential differences were observed.

In one complete antenna the length of the different segments was as follows: I (basal segment) 0.19, II 0.19, III 0.35, IV 0.28, V 0.30, VI 0.30, VII 0.27, VIII 0.29, IX 0.25, and X 0.33 mm; total length 2.75 mm. Of another antenna, in which one segment was missing, the total length was computed at 2.83 mm. In *M. toxopei* the antenna has a length of 4.0 mm. In *M. montanus* segment III is about 0.35 mm long, and its setae 0.30—0.40 mm. In *M. toxopei* segment III is about 0.50 mm long, and its setae are 0.70—0.80 mm (figs. 71 and 67). By their antennae the 2 species can easily be separated. Even with a pocket lens this is possible.

The legs in *M. montanus* are also smaller than in *M. toxopei.* Femur 0.50—0.55 mm, tibia 0.80 mm, tarsus 0.35 mm; total 1.65—1.70 mm as against 2.15—2.25 mm in *M. toxopei.*

Of two prepared specimens one had two pairs of caudal appendages (fig. 72), but in another only the apical appendages were present. Length of the two pairs about 0.40 and 0.25 mm.

In one specimen of *M. montanus* the two posterior abdominal spiracles with their tracheae were visible (fig. 73). More forward 3—4 other spiracles seemed to be present, but only their tracheae could be vaguely recognized, so that the spiracles themselves seemed to be either absent or rudimentary.

Types of *Monophlebulus toxopei* and *M. montanus* are in the Zoological Museum at Amsterdam.

---

*) In *Drosichoides haematoptera* Ckll. the setae of the apical part of the penis are black or blackish, and rather robust; length about 30 μ. In *Drosicha minor* sp.n. these setae are more slender, hyaline or yellowish, and only 15 μ long. In *Monophlebulus toxopei* sp.n. the setae are very slender, hyaline, and 40—50 μ long. In *Drosichoides* and *Drosicha* the dorsal side of the apical penis has very short, flattened, and pectinate setae which are absent in *Monophlebulus*. The setae on the ventral side in *Drosichoides* and *Drosicha* are as described above.

References

Betrem, J. G., 1937. Morphology and systematics of the principal mealybug species of Java. — Arch. Koffiecult. Ned. Indië 11 : 1—118 (Dutch, with English summary).

Borchsenius, N. S., 1957. Fauna USSR, Homoptera. — 9. Zool. Inst. Acad. USSR, new series Nr. 66. (Moscow-Leningrad). See fig. 16 on p. 17.

Buchner, P., 1957. Endosymbiosenstudien an Schildläusen, IV Hippeococcus, eine myrmekophile Pseudococcine. — Z. Morph. Oekol. der Tiere 45 : 379—410, 33 figs.

Bünzli, G. H., 1935. Untersuchungen über coccidophile Ameisen aus den Kaffeefeldern von Surinam. — Mitt. Schweiz. entom. Ges. 16 : 454—593, 51 figs.

Cockerell, T. D. A., 1915. A remarkable Monophlebine coccid from the Philippine Islands. — Canad. Entom. 47 : 344.

———, 1919. A new Monophlebine coccid from Borneo. — J. econ. Entom. 12 : 272.

Docters van Leeuwen-Reynvaan, J. & W. M. Docters van Leeuwen, 1926. The zoocecidia of the Netherlands East Indies, Botanic Gardens, Buitenzorg (p. 452).

Ferris, G. F., 1948. Description of *Ceroplastes rubens* Maskell in E. C. Zimmerman. — Insects of Hawaii 5 : 343—347. (Honolulu).

Forel, A., 1913. Ameisen aus Sumatra, Java, Malacca, und Ceylon. — Zool. Jahrb., Syst. 36 : 1—148.

———, 1915. Fauna simalurensis, Hymenoptera aculeata, Fam. Formicidae. — Tijdschr. Entom. 58 : 22—43.

Green, E. E., 1922. The Coccidae of Ceylon 5 : 345—472, pls. 133—191. (Dulau & Co., London).

———, 1930. Fauna Sumatrensis Nr. 65, Coccidae. — Tijdschr. v. Entom. 73 : 279—297.

Goot, P. van der, 1929. Remarks on the habits and distribution of Hippeococcus made in a conference of the Entom. Soc. at Bogor. — Entom. Berichten 9 : 65, 113.

Hambleton, E. J., 1946. Studies of hypogeic mealybugs. — Rev. Entom. (Rio de Janeiro) 17 : 1—77.

Kalshoven, L. G. E., 1950—1951. De plagen van de cultuurgewassen in Indonesië. 2 vols. — The Hague (Pests of cultivated plants in Indonesia).

Kuwana, I., 1922. Studies on Japanese Monophlebinae, the genus Warajicoccus. — Dept. Agric. & Comm., Imp. Plant Quar. Station. Bull. 1 : 1—58, pls. 1—12 (the present name of this genus is *Drosicha*).

———, 1923. Descriptions and biology of new or little-known coccids from Japan. — Dept. Agric., Imp. Plant Quarantine Station, Bull. 3 (fig. 4 on p. 17).

Laing, F., 1925. Descriptions of two species of Coccidae feeding on roots of coffee. — Bull. entom. Res. 15 : 383—384.

Morrison, H., 1920. The non-diaspine Coccidae of the Philippine Islands. — Philippine J. Sc. 17 : 147—202 (fig. 28, p. 188).

———, 1921. Some non-diaspine Coccidae from the Malay Peninsula. — Philippine J. Sc. 18 : 637—677.

———, 1927. Descriptions of new genera and species belonging to the coccid family Margarodidae. — Proc. Biol. Soc. Washington 40 : 99—109.

———, 1928. A classification of the higher groups and genera of the coccid family Margarodidae. — U.S. Dept. Agriculture Technical bulletin No. 52.

Morrison, H. & E. Morrison, 1923. The scale insects of the subfamilies Monophlebinae and Margarodinae treated by Maskell. — Proc. U.S. Nat. Mus. 62, art. 17.

Rahman, K. A. & M. A. Latif, 1945. Description, bionomics and control of the giant mealybug *Drosicha stebbingi* Green. — Bull. ent. Res. 55 : 197—209.

Rao, V. P., 1950. The status of the genus *Perissopneumon* Newstead. — Proc. Roy. Entom. Soc. London (B) 19 : 114—120.

Reyne, A., 1954. *Hippeococcus*, a new genus of Pseudoccocidae from Java with peculiar habits. — Zoöl. Med. 32 : 233—257, 53 figs.

———, 1957. *Walkeriana tosariensis*, a new Monophlebine coccid from Casuarina Junghuhniana Miquel in East-Java. Beaufortia 6 : 115—145, 50 figs.

———, 1964. Scale insects from the Netherlands Antilles. Beaufortia 11 : 95—130, 53 figs.

ROEPKE, W., 1930. Ueber einen merkwürdigen Fall von Myrmekophilie bei einer Ameise (*Cladomyrma* sp.?) auf Sumatra beobachtet. — Misc. Zoologica Sumatrana 45 : 1—3, 7 figs.

SILVESTRI, F., 1924. A new myrmecophilous genus of Coccidae from India. — Indian Museum Records 26 : 311—315, 5 figs.

———, 1926. Descrizione di un novo genere di Coccidae mirmecophilo delle Cina. — Boll. Lab. Zool. gen. agrar. (Portici) 18 : 271—275, 2 figs.

STAHEL, G., 1931, 1933. Zur Kenntnis der Siebröhrenkrankheit (Phloëmnecrose) des Kaffeebaumes in Surinam. — Phytopath. Zeitschr. 4 : 65—82, 539—544, 6 : 335—337. See also STAHEL's article of 1954 in Neth. J. agric. Sc. 2 : 260—264.

TAKAHASHI, R., 1934. Observations on the Coccidae of Formosa IV. — Formosa Govt. Res. Inst., Dept. Agric., Report 63 : 1—38 (p. 2).

VAYSSIÈRE, P., 1926. Contribution à l'étude biologique et systématique des Coccidae. — Ann. des Epiphyties 12: 197—382.

WESTWOOD, J. O., 1843. Arcana Entomologica I : 22. (W. Smith, London). (Pl. 6 contains coloured fig. of 8 males of Monophlebinae).

WILLIAMS, D. J., 1962. The British Pseudococcidae. — Bull. Br. Museum (Nat. Hist.), Entomology 12 : 1—79, 29 fig.

WIRJATI, 1958. A small mealybug from a virgin forest. — Idea (J. Ent. Soc. Indonesia) 11 : 12—17.

Tijdschrift voor Entomologie

Het verschijnt in één deel van 350—450 bladzijden per jaar, bestaande uit enkele afleveringen.

Entomologische Berichten

Deze zijn bestemd voor de publicatie van kortere artikelen, faunistische notities etc., alsmede van de Verslagen der Vergaderingen en van mededelingen van het bestuur. Zij verschijnen twaalf maal per jaar in een aflevering van 16 of meer bladzijden, die samen een deel vormen.

Trichopterorum Catalogus

Deze Catalogus van F. C. J. Fischer wordt door de Vereeniging voor rekening van de auteur uitgegeven. Alle bekende recente en fossiele soorten van de gehele wereld met hun synoniemen worden er in behandeld. Delen I en II kosten f 39.— per stuk, delen III—V: f 45.—. Er zullen in totaal 15 delen verschijnen. Van alle delen zijn ook éénzijdig bedrukte exemplaren beschikbaar. De prijsverhoging hiervoor bedraagt f 2.50.

Entomologia Experimentalis et Applicata

Dit tijdschrift wordt uitgegeven door de Noord-Hollandse Uitgevers Maatschappij te Amsterdam in opdracht van de Vereeniging. Het publiceert artikelen over experimentele biologie en oekologie bij insecten en andere land-arthropoden. Het verschijnt vier maal per jaar en bevat 320 bladzijden. De prijs voor leden bedraagt f 25.—, voor niet-leden f 40.— per jaar.

Alle zakelijke correspondentie betreffende de Vereeniging te richten aan de Secretaris, W. Hellinga, Weesperzijde 23II, Amsterdam-O.

Alle correspondentie over de redactie van het Tijdschrift voor Entomologie en de Monographieën te richten aan de Redacteur, Dr. A. Diakonoff, Rijksmuseum van Natuurlijke Historie, Leiden.

Alle correspondentie over de redactie van de Entomologische Berichten te richten aan de Redacteur, B. J. Lempke, Oude IJselstraat 12III, Amsterdam-Z. 2.

Alle correspondentie over de redactie van Entomologia Experimentalis et Applicata te richten aan de Redacteur, Dr. P. A. van der Laan, Lab. voor Toegepaste Entomologie, Linnaeusstraat 2 B, Amsterdam.

Alle betalingen te richten aan de Penningmeester, Drs. H. Wiering, Doorntjes 29, Bergen (N.H.), postgiro 188130, ten name van de Nederlandsche Entomologische Vereeniging te Bergen (N.H.).

Alle correspondentie betreffende de Bibliotheek der Vereeniging te richten aan de Bibliotheek, Zeeburgerdijk 21, Amsterdam-O.

Notice to Subscribers

All correspondence referring to subscriptions and exchange of the periodicals of the Netherlands Entomological Society should be addressed to the Librarian, Zeeburgerdijk 21, Amsterdam-O, Netherlands.

NOTICE TO CONTRIBUTORS

Contributors will receive free of charge fifty reprints of their papers, joint authors have to divide this number between them at their discretion. Additional reprints may be ordered when returning proofs.

Manuscripts should be written in Dutch, English, French, German or Italian. If they contain descriptions of new genera, species, etc., they should be in one of the four last mentioned languages.

The author should communicate with the editor before submitting his manuscript. He will enclose with manuscript a Synopsis (Abstract), styled according to recommendations of the UNESCO (style rules will be provided by the editor) and, if needed, a Summary. Papers in Dutch should contain an Abstract and/or a Summary in one of the four other languages.

Manuscripts should be typewritten in double spacing on only one side of the paper, with a margin of at least three cm at the left side of each sheet. Paragraphs should be indented. Carbon copies cannot be accepted, as handling makes them illegible.

Captions for text figures and plates should be written on a separate sheet in double spacing, numbered consecutively in arabic numerals; the use of a, b, c, or any other subdivision of the figure numbering should be avoided.

Drawings for reproduction should be on good paper in Indian ink, preferably at least one and a half times as large as the ultimate size desired. Lettering should be uniform, and, after reduction, of the same size. Photographs should be furnished as shiny positive prints, unmounted. Plates should be arranged so as to fill a whole page (11.5 x 19 cm) of the *Tijdschrift,* or a portion thereof, captions included. Combinations of illustrations into groups are preferable to separate illustrations, since there is a minimum charge per block.

Names of genera and lower systematic categories, new terms and the like are to be underlined by the author in the manuscript by a single straight line. Any other directions as to size or style of the type are given by the editors, not by the author. Italic type or spacing to stress ordinary words or sentences is to be avoided. Dates should be spelled as follows: either "10.V.1948" or "10 May, 1948". Other use of latin numerals should be avoided, as well as abbreviations in the text, save those generally accepted. Numbers from one to ten occurring in the text should be written in full, one, two, three, etc. Titles must be kept short. Footnotes should be kept at a minimum.

Bibliography should not be given in footnotes but compiled in a list at end of the paper, styled as follows:

Mosley, M. E., 1932, "A revision of the European species of the genus *Leuctra* (Plecoptera)". — Ann. Mag. Nat. Hist. [10] 10 (3): 1—41, pl. 1—5, fig. 1—57. Number of issue should only be added (in parentheses) when it has individual pagination.

Text references to this list might be made thus:
"Mosley (1932) says...." or "(Mosley, 1932)".

The editors reserve the right to adjust style to certain standards of uniformity.

Manuscripts and all communications concerning editorial matters only should be sent to: Dr. A. DIAKONOFF, Rijksmuseum van Natuurlijke Historie, Leiden, The Netherlands.

DEEL 108 AFLEVERING 7 1965

TIJDSCHRIFT VOOR ENTOMOLOGIE

UITGEGEVEN DOOR

DE NEDERLANDSCHE ENTOMOLOGISCHE VEREENIGING

NEDERLANDSCHE ENTOMOLOGISCHE VEREENIGING

INHOUD:

Tijdschrift voor Entomologie, deel 108, afl. 7. Gepubliceerd 17-IX-1965

Nederlandsche Entomologische Vereeniging

De contributie voor het lidmaatschap bedraagt f 15.—, voor student-leden f 2.50, per jaar. — Begunstigers betalen jaarlijks tenminstet f 15.—.

De leden, behalve de student-leden, ontvangen gratis de *Entomologische Berichten,* waarvan de prijs voor student-leden f 1.50 per jaar, voor niet-leden f 20.— per jaar en f 2.— per nummer bedraagt.

De leden kunnen zich voor f 10.— per jaar abonneren op het *Tijdschrift voor Entomologie*; hiervan bedraagt de prijs voor niet-leden f 35.— per jaar.

De eerder verschenen publicaties der Vereeniging zijn voor de leden tegen verminderde prijzen verkrijgbaar. De Vereeniging geeft de volgende publicaties uit.

Monographieën van de Nederlandsche Entomologische Vereeniging

Deze worden met onregelmatige tussenpozen uitgegeven. Er zijn reeds verschenen:

— F. T. Valck Lucassen et al. — Monographie du genre Lomaptera Gory & Percheron (Coleoptera, Cetoniidae), prijs f 50.—.

1. A. J. Besseling. — De Nederlandse Watermijten (Hydrachnellae Latreille, 1802), prijs f 25.—.

ON SOME JAPANESE APHIDIDAE (HOMOPTERA)

BY

D. HILLE RIS LAMBERS

Bladluisonderzoek T.N.O., Bennekom, Netherlands

Abstract

In a study on Far Eastern Aphididae (Homoptera) the following new genera, species, and subspecies are described.

Ryoichitakahashia gen. nov., type-species *R. ilicis* spec. nov. with as synonym *Anuraphis celastri* Shinji, 1941, nec Matsumura, 1917, from *Ilex serrata,* Japan. *Neodysaphis* gen. nov., type-species *N. deutziae* spec. nov. from *Deutzia,* Japan. *Juncomyzus* gen. nov., type-species *J. obscurus* spec. nov. from *Juncus* ?, Japan. *Longicaudinus* gen. nov., type-species *Hyalopteroides sinensis* Tao, 1963, a probable synonym of *Pergandeidia corydisicola* Tao, 1962. *Longicaudus dunlopi* spec. nov. from *Thalictrum flavum,* Netherlands, of which *Semiaphis sphondylii* van der Goot, 1915, nec Koch, 1854, is a synonym. *Longicaudus himalayensis* spec. nov. vagrant on *Quercus*?, India. *Trichosiphoniella formosana* spec. nov. from *Prunus persica,* Formosa. *Cryptomyzus taoi* spec. nov. from *Marrubium supinum,* China. *Cavariella takahashii* spec. nov. from *Salix,* Japan. *Matsumuraja nuditerga* spec. nov. from *Rubus,* Japan. *Longicaudus trirhodus* subspec. *japonicus* nov., from *Rosa* and *Thalictrum,* Japan.

The genus *Recticallis* Matsumura, 1919, is discussed. *Tuberculoides nigrostriata* Shinji, 1941, and *Myzocallis pseudoalni* Takahashi, 1921, are transferred to *Recticallis,* and *Tuberculoides alnifoliae* Shinji, 1941, is synonymized with *Recticallis alni-japonicae* Matsumura, 1919.

Myzus rhois Takahashi, 1924, is referred to *Sumoia* Tao, 1963, and *Sitomyzus japonicus* Takahashi, 1963, is declared a synonym of the first.

Megoura japonica Okamoto & Takahashi, 1927; *Nectarosiphon moriokae* Shinji, 1923; *Amphorophora lathyro* Shinji, 1924; *Megoura japonica* Shinji, 1933; *Megoura japonica* Takahashi, 1937; and *Megoura viciae coreana* Moritsu, 1948, are declared synonyms of *Megoura viciae* subspec. *crassicauda* Mordvilko, 1919, which is raised to the specific rank.

Trichosiphoniella Shinji, 1929, is discussed; *Aphis spinulosa* Essig & Kuwana, 1918, is transferred to *Trichosiphoniella* and considered a species distinct from the type-species of *Trichosiphoniella.*

In a discussion of *Takecallis* Matsumura, 1917, *T. bambusae* Matsumura, 1917, is declared a synonym of *Callipterus arundicolens* Clarke, 1903; *Myzocallis bambusifoliae* Takahashi, 1921, is tentatively synonymized with *Myzocallis arundinariae* Essig, 1917. *Myzocallis sasae* Matsumura, 1917, is referred to *Takecallis* and distinguished from *Myzocallis taiwana* Takahashi, 1926. *Therioaphis tectae* Tissot, 1934, is considered a synonym of *Myzocallis taiwana* Takahashi.

It is suggested that *Aphis soyogo* Uye, 1923 represents the variety with the twice furcated media in the forewings of *Toxoptera aurantii* (Fonscolombe, 1841) and the name *soyogo* is suggested for this variety.

Introduction

Dr. R. Takahashi used to send me material of most of the Japanese aphids that he discovered or rediscovered and my Californian colleague, Dr. R. van den Bosch, gave me many aphids collected by him in Japan in 1964. Death came to

Dr. TAKAHASHI in 1963 and I now am obliged to follow his suggestions to publish on some of the material that he sent.

Ryoichitakahashia gen. nov.

Diagnosis. Like *Aphis* L., with marginal tubercles on abdominal segments I (on the line between abdominal stigmata I and II), VII (below the stigmata) and II—IV, with single pairs of spinal and on the anterior four abdominal tergites very irregularly pleural hairs, but with a very large number of marginal hairs, 20—30 on each of abdominal segments II—IV, and with a concave front as in certain *Macrosiphoniella* species. Hind tibiae also in young larvae without sound pegs. Type-species: *Ryoichitakahashia ilicis* spec. nov.

Ryoichitakahashia ilicis spec. nov.

Apterous viviparous female.

Body rather broad, with only the head and a long bar across abdominal tergite VIII brown sclerotic. Abdominal tergum faintly, marginally more distinctly reticulated. Marginal tubercles on abdomen rounded, semiglobular to as high as their basal width, on abdominal segments I—IV and VII. Dorsal hairs fine, wavy, about 3 times as long as basal diameter of antennal segment III but often some of the erratic pleural hairs short and as long as that diameter; spinal hairs usually in a complete row of pairs, but pleural hairs on abdomen very irregularly present, marginal hairs very numerous and abdominal tergite VIII with some 10—16 hairs. Front smooth, straight in the middle, with low, very strongly diverging frontal tubercles to rather evenly concave, near the antennal bases blackish. Antennae about as long as body, thick, strongly imbricated with basal segments and basal $^1/_4$—$^1/_3$ of segment III blackish brown, distal $^1/_3$ of III, distal $^1/_3$—$^1/_2$ of IV, distal $^1/_3$ of V and mostly the whole VI brown to blackish brown, the middle part of III light to dark brown, the basal parts of IV and V whitish to yellowish and the processus terminalis lighter than the basal part of last segment; III on distal half with about 5—15 bulging rhinaria along one side; IV with 0—6 rhinaria; antennal hairs very numerous, very long, like the dorsal body hairs; processus terminalis 4—5 times as long as basal part of VI, $1^1/_{10}$—$1^1/_5$ times III. Rostrum reaching to the middle of the hind coxae; last segment thick and blunt, with 2—3 pairs of lateral hairs besides the 3 subapical pairs, about $1^1/_{10}$ times as long as second joint of hind tarsi. Legs rather stout, blackish brown to black with only the very base of the femora and the middle $^3/_5$ (fore and middle legs) or basal half (of the hind legs) of the tibiae yellow to brownish yellow, with the same number and type of spreading hairs as the antennae, but on the inner side of particularly the hind tibiae near apex with some much shorter spiny hairs; first tarsal joints with 3, 3, 2, sometimes 3, 3, 3, rather short hairs, the second joints, apart from 4 ventral and lateral hairs of 0.008 mm, near apex with the smallest and thinnest hairs possible, less than 0.002 mm long. Siphunculi jet black, evenly imbricated, at base as thick as the middle or the apex of the femora, tapering to half that width just below the apex, about $^1/_5$ of the length of body, with hardly developed flange. Cauda brown, variable, shortly bluntly conical to rounded, with

very narrow "hard" portion, just shorter than its basal width, $1/_3$, rarely $1/_4$ of the length of the siphunculi, with some 18—24 long hairs. Subgenital plate as hairy on anterior part as on posterior margin but with few hairs in between.

Measurements in mm. Length body: 2.14; antenna: 1.97; antennal segments: III: 0.51, IV: 0.31, V: 0.29, VI: (0.11 + 0.53); siphunculus: 0.44; cauda: 0.13. Rhinaria on antennal segment III: 10 and 13.

Holotype. Apterous viviparous female, host unknown, Mt. Hikosan, Biological Research Station, Kyushu, Japan, 10.VI.1964, leg. R. VAN DEN BOSCH. Paratypes. Apterae viviparae with the same data, and 3 apterae viviparae from *Ilex serrata,* Kobuka, Kawachi-Nagano, Osaka Prefecture, Japan, leg. M. SORIN.

Notes. According to field notes by Dr. VAN DEN BOSCH this is a dull black species occurring in dense colonies on stems. Dr. TAKAHASHI first sent the species as an unknown *Dysaphis?* However, the species is not unknown. Figures on p. 470 in SHINJI (1941) relate to this aphid, under the name *Anuraphis celastri* Mats. But MATSUMURA (1917) described the cauda of *Aphis celastri* as: "large, somewhat longer than the tarsi, in the middle constricted", etc., and stipulates that in the aptera antennal segment III has no sensoria. According to information received from Dr. M. SORIN the host plant given by SHINJI (1941, in Japanese) is *Ilex serrata* var. *sieboldii.* UYE (1923) described *Aphis soyogo* from *Ilex* in Japan, but from his figures and the description as translated for me by Dr. SORIN it would seem that UYE described the form with a twice furcated media of *Toxoptera aurantii* (Fonsc.) from *Ilex pedunculata, Thea japonica* and *Eurya japonica,* a form which might be called *Toxoptera aurantii* var. *soyogo.*

Neodysaphis gen. nov.

Diagnosis. Fundatrix *Aphis*-like with the oval abdominal stigmata I and II not much nearer each other than II and III, with the tergum membranous, with rather long, fine, acute hairs; head broad, front as in *Aphis* L., antennae without secondary rhinaria, of 6 segments; siphunculi faintly incrassate, constricted near the tip, not spinulose, not reticulated; cauda very short, much wider than long, triangular, rather acute; no marginal nor spinal tubercles present. Alatae also without distinct frontal tubercles, distance between eye and basis of antenna as long as basal diameter of antennal segment III; abdomen with stigmal pori I and II very near each other, with typical *Myzus*-like central sclerite; antennae with few rhinaria on antennal segment III. First tarsal joints in adults with 4, 4, 4 hairs (two sense pegs, two thinner lateral hairs). No larvae available. Type-species: *Neodysaphis deutziae* spec. nov.

The genus looks rather like *Dysaphis* Börner, also in its Aphidine fundatrix but "Myzine" alatae, but the absence of tubercles, the few rhinaria in alatae and above all, the chaetotaxy of the tarsi, separate it.

Neodysaphis deutziae spec. nov.

Fundatrix.

Body about 2.35 mm long, roundish, membranous, smooth, with normal, fine hairs of about 0.030 mm long. Front slightly sinuated, smooth. Antennae of 6

segments, very dark, nearly smooth with only the processus terminalis imbricated, with normal rather small primary rhinaria and a few hairs as long as about half basal diameter of segment III. Eyes with triommatidion and some 30 facets. Rostrum probably with 2 hairs besides the 3 subapical pairs. Siphunculi blackish, cylindrical, with apical constriction or also basally slightly attenuated, about 6 times as long as their halfway width, evenly lightly imbricated, with rather large flange. Legs brownish yellow with dark knees, smooth, with local very slight imbrications on the femora; hind tibiae with a number of pseudosensoria on distal half; first tarsal joints with 4, 4, 4 hairs.

Measurements in mm. Length body: 2.34; antenna: 0.90; antennal segments: III: 0.28, IV: 0.19, V: 0.21, VI: (0.065 + 0.07); siphunculus: 0.35; cauda: 0.07.

Alate viviparous female.

Very different from fundatrix, slightly smaller. Front similar. Antennae considerably shorter than body; segment III with 3—10 (average 6.0) mostly rather large rhinaria along one side, irregularly placed; primary rhinarium on segment V unusually large with a broad rim and protruding but apically flat membrane, the one on segment VI slightly smaller. Eyes large. Last rostral segment bluntish with 2—4 hairs besides the 3 subapical pairs, $1^1/_3$ times second joint of hind tarsi. Wings with normal venation, but second fork of the media rather close to wing tips and stigma rather long. Legs rather long and blackish, femora with rather long, somewhat spiny hairs, hairs on the tibiae shorter, gradually longer towards apex; hind tibiae with a small number of pseudosensoria on distal half; first tarsal joints with 4, 4, 4 hairs. Abdominal dorsum with a large, dark, spinapleural central sclerite from tergites II—VI, with some perforations along the segmental borders and with irregular sides (as in *Myzus* proper). Siphunculi rather dark, mottled, mostly basally and apically darkest, cylindrical, with a slight attenuation below the small flange, as thin as thickest part of the hind tibiae, evenly imbricated, nearly $^1/_6$ body's length. Cauda triangular, about $^1/_4$ of the siphunculi, with 5 hairs.

Measurements in mm. Length body: 2.08; antenna: 1.57; antennal segments: III: 0.37, IV: 0.32, V: 0.24, VI: (0.13 + 0.34); siphunculus: 0.34; cauda: 0.085. Rhinaria on antennal segment III: 9 and 10.

Holotype. Alate viviparous female, from *Deutzia,* Mt. Kongo, Osaka Prefecture, Japan, 17.V.1959, leg. R. TAKAHASHI. Paratypes. One alate and one fundatrix with the data of the holotype, and some mostly damaged alatae, *Prunus* sp.?, locality as above, 29.V.1964, leg. R. VAN DEN BOSCH, V-29t.

Notes. Dr. R. VAN DEN BOSCH provided some mostly strongly damaged alatae from *Prunus*?, but a few years before Dr. TAKAHASHI had sent the same insect from the same locality, however, with *Deutzia* as host plant. Some elements in the description of *A. utsigicola* Monzen, 1929, from *Deutzia scabra,* such as the dark patch on the abdomen in the alate suggest that he was dealing with our new species. But the distribution of sensoria of the antennae, the description of the cauda with 10 hairs, marginal tubercles, etc., make MONZEN's species very different from *Neodysaphis deutziae* spec. nov.

As the second generation apparently is completely alate, one may assume that the species has host alternation. Recognition is easy by the pseudosensoria on the hind tibiae in viviparae.

Juncomyzus gen. nov.

Diagnosis. Head broad, ventrally and dorsally above the front and around the antennal bases very scabrous, with straight front and low, diverging, on the inner-side conspicuously rounded, frontal tubercles. Antennae of about body's length; segment III in apterae with some rhinaria, in alatae also IV sometimes with a few. Rostrum normal. Wings with twice forked media. Dorsum in apterae variably sclerotic with perforations and with reticulation, in alatae membranous. Dorsal hairs very short, blunt, scarce. Siphunculi long, imbricated, with flange, not swollen. Cauda elongate. Legs normal; first tarsal joints with 3, 3, 3 hairs, but the lateral hairs only $^1/_3$—$^1/_2$ of the length of the middle hair. Few spinules on the hind tibiae in nymphs. Type-species: *Juncomyzus obscurus* spec. nov.

The genus seems to be related to *Neomyzus* van der Goot, but the broad head with the low diverging frontal tubercles distinguish it. The presence of rhinaria on antennal segment III distinguishes it from *Myzus* Pass. *Sumoia* Tao, 1963, the type-species of which I have not seen, according to TAO's figure, differs in the chaetotaxy of the first tarsal joints which in *Juncomyzus* more than anything else resembles that of *Pentalonia* Coq.

Juncomyzus obscurus spec. nov.

Apterous viviparous female.

Body 1.23 to 1.81 mm long, oval, not depressed, in very small specimens dorsally only marginally and caudad the siphunculi with some brownish sclerotisation, in normal specimens with irregular darkish sclerotic transverse bars that tend to coalesce; especially on the sclerotic areas reticulated. No marginal or spinal tubercles. Dorsal hairs very short, scarce and inconspicuous; abdominal tergite VIII with 4—6 such hairs. Head twice as wide as long, dark, scabrous except on most of its dorsal surface. Front straight to faintly convex in the middle, with low, strongly diverging (30—45°), rounded frontal tubercles. Antennae scabrously imbricated, longer than body, rather thick, dark except for the pale basal $^1/_3$—$^2/_3$ part of segment III; segment III in apterae not at base but more or less on the middle part with 1—5 rather flat rhinaria on a thickened part of the segment; for interrelation of segments vide measurements; antennal hairs very scarce and the few present hardly higher than the imbrications. Rostrum nearly reaching the hind coxae, the short, rather blunt last segment about $1^1/_{10}$ times as long as second joint of hind tarsi, with 1—4 short hairs besides the 3 subapical pairs. Legs normal, with dark, scabrous femora and smooth, short-haired, yellowish tibiae with dark apices; first tarsal joints with one spiny median hair and two short lateral hairs. Siphunculi black, about $^2/_7$ of length of body, straight in dorsal view, but bent near base in lateral view, rather evenly tapering, in the middle about $1^3/_8$ times as thick as half-way width of hind tibiae, markedly, densely semibluntly imbricated throughout

with somewhat denticulate imbrications, with rather small flange. Cauda dark, rather elongate, conical with rounded tip, $^1/_3$ of the siphunculi. Subgenital plate with 2—5 short hairs on anterior half.

Measurements in mm. Length body: 1.47; antenna: 1.63; antennal segments: III: 0.33, IV: 0.29, V: 0.22, VI: (0.12 + 0.49); siphunculus: 0.46; cauda: 0.14. Rhinaria on antennal segment III: 3 and 4.

Alate viviparous female.

Head and thorax black sclerotic; abdominal dorsum only with rather conspicuous pleural sclerites, marginal and postsiphuncular sclerites; only the postsiphuncular sclerites reticulated. Antennal segment III with 6—12 rhinaria in an irregular row, segment IV with 1—3 rhinaria. Wings with normal venation, the veins rather thick, brownish and very narrowly and vaguely bordered. Siphunculi more cylindrical with enlarged base. Cauda slightly shorter and more acute. Otherwise similar to apterae.

Measurements in mm. Length body: 1.55; antenna: 1.78; antennal segments: III: 0.36, IV: 0.33, V: 0.25, VI: (0.14 + 0.54); siphunculus: 0.39; cauda: 0.13. Rhinaria on antennal segment III: 8 and 9; on IV: 1 and 2.

Larvae: only on the dorsal surface of the hind tibiae somewhat scabrously spinulosely imbricated; in lateral view this is only visible by a serrated dorsal outline. No sclerotisation on abdomen.

Holotype. Apterous viviparous female, from *Juncus* sp.?, Nara, Osaka-Fu, Japan, 25.V.1964, leg. R. VAN DEN BOSCH, V-25a. Paratypes. Apterae and alatae viviparae with the same collecting data.

Notes. In a search for the name for this species I came across *Aulacorthum scirpi* van der Goot, 1917, but the colour and the interrelation of the antennal segments did not agree. In the Japanese literature, including the pictures in SHINJI's (1941) monograph, I found no reference to aphids resembling the present one and therefore I am describing it as a new species. According to the collector the species is dull black in life and it lives in thick colonies on the stems of the host plant.

Recticallis Matsumura, 1919

The genus was erected with *Recticallis alni-japonicae* Mats., 1919, as the type-species, but has since been neglected, as the few species known have been placed in *Myzocallis, Agrioaphis,* etc. Yet recognition is extremely easy. The genotype has a row of quite long scabrous unpaired processi on the anterior abdominal tergites. Slides received from the late Dr. TAKAHASHI show that he accepted the genus *Recticallis* and besides the type-species, placed also *Tuberculoides nigrostriata* Shinji, 1941, in it. It appears from SHINJI's figures that *Tuberculoides alnifoliae* Shinji, 1941, is a synonym of the type-species. Examination of authentic material of *Myzocallis* (later, in 1931, *Agrioaphis*) *pseudoalni* Tak., 1921 ,shows that *pseudoalni* should be referred to the genus *Recticallis* Mats.

Examination of embryos of all three species, and of a number of older larvae of the genotype shows that *Recticallis* is nearest related to *Pterocallis* Pass., 1860. The long knobbed hairs have conspicuously rough shafts. The processus terminalis is typically shorter than the basal part of the last antennal segment. The genus seems to differ from *Pterocallis* only in the presence of very long unpaired processi on the abdomen in adult winged morphs and in the fact that all viviparae are winged.

It is possible that Japanese material from *Alnus sieboldianus* belongs to a fourth species. Specimens from that host have a faint smoky dash between the tips of the sector radii and the upper branch of the media, their siphunculi are more slender than in *alni-japonicae* identified by Dr. TAKAHASHI, and the embryos inside have the spinal hairs on Vth abdominal tergite very thick and 0.048 mm long, as against the thinner, 0.052 mm long hairs in embryos of *alni-japonicae* Mats., as identified by Dr. TAKAHASHI.

Myzus rhois Tak., 1924

In a recent paper (1963) Dr. TAKAHASHI renamed this aphid *Sitomyzus japonicus,* because he placed the species in *Sitomyzus* H.R.L. where it would be preoccupied by *Sitomyzus rhois* (Monell, 1879). However, *rhois* Monell belongs in *Glabromyzus* Richards, 1960, and *Myzus rhois* Tak. is not congeneric with *rhois* Monell, could not possibly be placed in *Sitomyzus* H.R.L. and probably is a *Sumoia* Tao, 1963. Therefore *Sitomyzus japonicus* Tak., 1963, becomes a synonym of *Sumoia rhois* (Takahashi, 1924).

Megoura crassicauda Mordvilko, 1919

The Japanese relative of *Megoura viciae* Buckt. differs from its European form in the apterae having numerous strongly protruding rhinaria over about $^3/_4$—$^9/_{10}$ of antennal segment III along one side of the segment, while in alatae also antennal segment IV is covered with a number of rhinaria. MATSUMURA (1918) described *Rhopalosiphum viciae* var. *japonicum* from *Vicia unijuga* but as he described the heads in apterae and alatae as greenish yellow and yellowish green, respectively, he probably had *Megoura lespedezae* Essig & Kuwana.

OKAMOTO & TAKAHASHI (1927) described *Megoura japonica* (Mats.) from *Vicia cracca, V. flava* and *V.* sp. from Corea and this undoubtedly is the species that Dr. VAN DEN BOSCH collected in Japan and that Dr. TAKAHASHI sent me as *Megoura viciae japonica* Mats. from Japan. However, in SHINJI's monograph of Japanese aphids (1941) the same species is described and figured as *Amphorophora lathyri* Shinji (1924), which name is older than *M. japonica* Okamoto & Takahashi. MATSUMURA (1918) described his aphid as a variety and therefore his name cannot be used as the author of a species *M. japonicum,* apart from the different identity of his aphid.

MORITSU (1948) also described this aphid under the name *Megoura viciae* Matsumura and recorded *Nectarosiphon moriokae* Shinji, 1923, *Amphorophora lathyri* Shinji, 1924, *Megoura japonica* Shinji, 1933, and *Megoura japonica* Taka-

hashi, 1937, as synonyms. But MORITSU gave to *Megoura japonica* Okamoto & Takahashi, 1927, a new subspecific name, *Megoura viciae coreana,* which is not necessary, as the name *japonica* was not preoccupied. He described the variability of his *japonica* and separated it from his *coreana* by a smaller number of rhinaria, 20—40 for *viciae japonica* in the key, 14—43 on p. 87 of his paper.

MORDVILKO (1919) described *Megoura viciae* subsp. *crassicauda* from *Lathyrus* and *Vicia faba,* from Slavjanka and Tchernigovka, in the Maritime Territory just north of North Korea, separating this subspecies by a thicker cauda from *viciae* sensu stricto. This character is not effective, but in the description MORDVILKO writes that apterae have 30—40 (41 in his measurements) rhinaria over $^3/_4$—$^5/_6$ of the length of antennal segment III. Consequently the name *Megoura crassicauda* Mordv. has to be used for the Japanese equivalent of *Megoura viciae* Buckton, while *Megoura viciae coreana* Moritsu may well be a synonym of *crassicauda* Mordv.

Longicaudus van der Goot, 1913 and **Longicaudinus** gen. nov.

So far only one species, *Aphis trirhodus* Wlk., 1849 has been assigned to *Longicaudus* van der Goot. However, more species should be attributed to this genus.

VAN DER GOOT in 1913 recorded as *Longicaudus,* and in 1915 described as *Semiaphis sphondylii,* what he thought to be *Hyalopterus sphondylii* Koch, 1854, from an unidentified Umbellifera. Comparison of his 1915 description with the original description of *Hyalopterus sphondylii* Koch immediately shows that this identification was wrong. VAN DER GOOT's aphid is an entirely pallid insect, KOCH's *sphondylii* is a typical *Semiaphis,* with a dark head, cauda and siphunculi.

An insect completely agreeing with VAN DER GOOT's description was collected in 1946 from *Thalictrum flavum* L. by Mr. DUNLOP. It agrees in chaetotaxy of the tarsi, etc., with *Longicaudus trirhodus* (Wlk.), has like that species the extremely long third antennal segment, but the processus terminalis is about $1^3/_5$—2 times as long as the basal part of antennal segment VI and the siphunculi are even shorter than those in *trirhodus* Wlk. while they have hardly any flange. I believe that VAN DER GOOT, who was not a very good botanist, mistook *Thalictrum* for an Umbellifera. Herewith I rename *Semiaphis sphondylii* van der Goot, 1915, nec KOCH, 1854, **Longicaudus dunlopi** nom. nov. I should point out that also *Longicaudus trirhodus* (Wlk.) infests *Thalictrum* besides *Aquilegia,* but the species can very easily be separated by the length of the processus terminalis.

Japanese *Longicaudus* from *Rosa* and from *Thalictrum* in some respects differ from Western European material. All alatae from both hosts that I have lack the square black sclerotic patch on the abdomen but instead have a few disconnected rather rudimentary crossbars on segments III—V. The processus terminalis in specimens from *Rosa* (alatae and one aptera) is about 5—10% longer than the basal part of last antennal segment, in specimens from *Thalictrum* 30% (aptera) to 75% longer than that part. The chaetotaxy of the tarsi agrees with Western European specimens. For the Japanese material I propose the name **Longicaudus trirhodus japonicus** subsp. nov.

Two alate aphids, collected on *Quercus?*, Kufri (Simla), India, Oct. 1957, leg. K. K. NIRULA, have the black central abdominal sclerite, the very long third an-

tennal segment (equals IV + V + VI) with some 75 very tuberculate rhinaria, the short last rostral segment, etc., of *Longicaudus trirhodus* (Wlk.), but the first tarsal joints have 6 hairs (2 sense pegs), the antennal segment IV has 0—3 (0 & 1; 2 & 3) rhinaria, the processus terminalis is $2^1/_3$—$2^1/_2$ times as long as the base of segment VI and the siphunculi (0.135 mm) are about as long as the cauda, $1^2/_7$ times as long as second joint of hind tarsi (in alate *trirhodus* siphunculus: cauda: second joint hind tarsi is 1 : (2 to $2^1/_2$) : $1^1/_2$). Because of the several differences I propose the name **Longicaudus himalayensis** spec. nov. for this material.

Finally there is *corydisicola* Tao, 1962, which CHENG CHU TAO placed in *Pergandeidia* together with *trirhodus* Wlk. I have not examined type material of this species, but the late Dr. TAKAHASHI sent me some apterae from *Corydalis* from Japan for identification. Cotypes of *Hyalopteroides sinensis* Tao, 1963, would seem to be the same species as *corydisicola.* I find for both cotypes of *sinensis* and Japanese specimens from *Corydalis* 3, 3, 2 hairs on the first tarsal joints and 7—9 hairs on the cauda, and therefore the only differences seem to be in the number of rhinaria in alatae, 9—10 in *corydisicola,* 13—15 in *sinensis.* Alatae have the typical abdominal ornamentation of *Longicaudus trirhodus* Wlk.

I erect the new genus **Longicaudinus** gen. nov., type-species *Hyalopteroides sinensis* Tao, 1963, of which I have authentic material. This genus differs from *Longicaudus* in the chaetotaxy of the first tarsal joints and the different antennae. The type-species may be the same as, or a subspecies of *corydisicola* Tao, 1962. Two of the Japanese apterae of the latter show an extensive dusky pleural sclerotisation.

Trichosiphoniella Shinji, 1929

Two Japanese aphids have been referred to *Trichosiphoniella: Myzus momonis* Mats., 1917, and *Myzus sasakii* Mats., 1917, both forming galls or pseudogalls on *Prunus* leaves. MORITSU (1947) has dedicated a special paper to the group of four *Myzus* species that form galls on *Prunus* trees in Japan, giving a key. Dr. R. VAN DEN BOSCH collected several samples of *Myzus* with hairs on the siphunculi in Japan; according to the material that I now possess, there would seem to be confusion among the various Japanese authors on the identity of these aphids.

(1) In one sample, with a number of fundatrices with 4 antennal segments and very curious thin siphunculi, the alatae have lightly imbricated siphunculi with few hairs, at most 2, a rather short processus terminalis, and there is no distinct central sclerite on the abdominal dorsum. This sample is from Dazaifu Shrine, Fukuoka Prefecture, Japan, 29.IV.1964, leg. R. VAN DEN BOSCH IV-29c. The material agrees perfectly with one identified by the late Dr. TAKAHASHI as *sasakii* and collected at Wakayama, Japan, 23.V.1954, leg. R. TAKAHASHI. Also nymphs in both these samples agree very well in the fact that they have a large number of spinules on the outside of the hind tibiae. We can therefore follow MORITSU (1947) and Dr. TAKAHASHI and define *T. sasakii* Mats. as the species with 4 antennal segments in the fundatrices, without a developed central abdominal sclerite in alatae and nymphs with spinulose hind tibiae. The species apparently leaves *Prunus* in the

second generation as no apterae except fundatrices occur on *Prunus*. Dr. TAKAHASHI wrote to me that the species migrates to *Artemisia* and sent me a slide of apterae from *Artemisia* (Osaka, Japan, VI-1957, leg. R. TAKAHASHI) which look like a *Phorodon* in the structure of head and antennal segment I, without hairs on the siphunculi; the larva in this slide still has its spinulose hind tibiae.

(2) Also *Trichosiphoniella momonis* Mats. is available from Japan, from "Cherry", Osaka, Japan, 5.V.1954, leg. R. TAKAHASHI, and from "Cherry", Kashi Shrine near Fukuoka, 22.IV.1964, leg. R. VAN DEN BOSCH, IV-22a. The latter sample contains stem mothers with 5-segmented antennae and one aptera vivipara of the second generation besides many alatae and nymphs. The slide from Dr. TAKAHASHI holds a second generation aptera, two alatae and nymphs. The specimens, especially apterae and nymphs, have markedly flanged, scabrously imbricated siphunculi with several short hairs of about 0.016 mm long. The alatae have thicker antennae with more rhinaria and a slightly longer processus terminalis than in the preceding; on the abdomen there is a distinct but rather perforated central sclerite. All the characters mentioned by MORITSU (1947) are present. The insects are very similar to *T. sasakii* Mats., but all the nymphs have only 1—3 inconspicuous spinules on the hind tibiae. By the latter character samples with nymphs are very easily recognized.

MATSUMURA (1917) originally described *Myzus momonis* from *Prunus persica* and does not mention galls, although he does so for *Myzus sakurae* and *M. sasakii* on the same page. MORITSU (1947) mentions numerous samples from various *Prunus* spp., but writes that he has not collected the species on *Prunus persica.*

(3) I have material from *Prunus persica* from Formosa (Kagi, VIII.1928, leg. TAKAHASHI) identified by Dr. TAKAHASHI as *Myzus momonis* Mats. In the samples are some apterae viviparae and nymphs and they differ very considerably from the *momonis* mentioned sub (2). The nymphs have very large numbers of spinules over the whole length of the hind tibiae and not only on the hind tibiae but also on the fore and middle tibiae. Even the adult apterae have a large number of spinules on all tibiae. Quite clearly the Formosan *momonis* are not the same as the Japanese ones: the late Dr. BÖRNER would certainly have placed them in different genera. They differ from TAKAHASHI's Osaka 1954 *momonis* as apterae also by the complete absence of sclerotisation or pigmentation, a rounder body and shorter extremities; their dorsal hairs (0.013 mm) are only little shorter than those of Japanese apterae (0.017 mm).

The Formosan material from *Prunus persica* recorded by TAKAHASHI (1924) and TAO (1963) does not agree with any of the published descriptions of *momonis* [or of its synonyms, according to MORITSU (1947), *Myzus higansakurae* Monzen, 1927, and *Myzus rarus* Monzen, 1927]. I therefore propose the name **Trichosiphoniella formosana** spec. nov. The holotype and paratypes, all apterous viviparous females, are from *Prunus persica,* Kagi, Formosa, VIII.1928, leg. R. TAKAHASHI.

(4) A sample from *Prunus* spec., Mt. Kongo, Osaka, Japan, 29.V.1964, leg. R. VAN DEN BOSCH, V-291, is again quite different. Only apterae viviparae are present and they differ from the specimens mentioned under 2 and 3 by having much longer hairs on the dorsum (0.035 mm), siphunculi (0.021—0.026 mm)

and antennae. The hind tibiae in nymphs have sporadic spinules. The tergum is rather heavily dark sclerotic. The figures in ESSIG & KUWANA (1918, p. 77) of their *Aphis spinulosa* from "Cherry" agree perfectly with material mentioned sub (4) as to length and numbers of hairs, and shape of cauda but do not agree at all with material mentioned sub (2). Therefore the sample R. VAN DEN BOSCH V-291 is considered to be *Trichosiphoniella spinulosa* (Essig & Kuwana, 1918).

Cryptomyzus taoi spec. nov.

Apterous viviparous female.

Body about 2.00—2.25 mm long, with colourless integumentum. Knobbed hairs on abdomen numerous, on abdominal tergites II—IV per segment about 14—18, of which the longest are about $2^1/_2$ times as long as halfway diameter of the hind tibiae; marginal groups on these segments composed of 4—5 hairs each, more rarely 3 hairs. Antennae pallid, $1^2/_7$ times length of body; segment III with some 6—11 bulging rhinaria irregularly placed along one side on basal $^1/_3$ part; processus terminalis about $2^3/_4$—$2^5/_6$ times segment V; hairs on segment III up to $^5/_7$ of basal diameter of that segment, about half as long as longest hair on segment I. Rostrum with last segment $1^1/_3$—$1^1/_2$ times as long as second joint of hind tarsi, with 7—9 hairs besides the 3 subapical pairs. Siphunculi $^1/_5$—$^1/_4$ of length of body, very distinctly swollen on distal half and there $1^1/_3$—$1^3/_5$ times as wide as the smallest width more basad, with small flange. Cauda very short, $^1/_5$ of the length of the siphunculi, with 7 hairs.

Measurements in mm. Length body: 2.17; antenna: 1.29; antennal segments: III: 0.64, IV: 0.46, V: 0.37, VI: (0.11 + 1.00); siphunculus: 0.51; cauda: 0.10. Rhinaria on antennal segment III: 8 and 11.

Alate viviparous female.

Abdomen with a large compact trapezoidal central sclerite from the hairs of segment III to those on segment VI, laterally including pleural sclerites, cephalad partly connected with spinal and pleural sclerites around hair-bases on tergite III, with some rather large perforations between tergites V and VI spinally; hairs on dorsum still rather stout and knobbed, the longest on tergite III just longer than halfway diameter of hind tibiae; marginal sclerites with 3—4 knobbed hairs. Antennae black; segment III with about 47—51 slightly tuberculate bulging rhinaria, IV with 24—28, V with 8—10; processus terminalis $3^1/_4$ times segment V. Siphunculi in the swollen area about $1^3/_4$ times as wide as the thinnest part of the stem.

Measurements in mm. Length body: 2.00; antenna: 2.63; antennal segments: III: 0.64, IV: 0.46, V: 0.37, VI: (0.11 + 1.00); siphunculus: 0.51; cauda: 0.10. Rhinaria on antennal segment III: 47 and 50; on IV: 25 and 25; on V: 8 and 8.

Holotype. Apterous viviparous female, on *Marrubium supinum,* Chengtu, Szechuan, China, I.XII.1936, leg. C. C. TAO. Paratypes: apterae and alatae with the same collecting data.

Notes. The species clearly belongs in the relationship of *Cryptomyzus ribis* (L.), not in that of *C. galeopsidis* (Kltb.), and the apterae in my key (1953) run to couplet 7 (6), which holds *C. korschelti* Börner and *C. heinzei* H.R.L. The latter is excluded because of its 2—3 pairs of marginal hairs on abdomen and the short hair on antennal segment I, while indeed *C. korschelti* Börner is very nearly related to *C. taoi* spec. nov. However, *C. taoi* has marginal groups of 4—5 hairs, *C. korschelti* groups of 3, rarely 4, and as also more additional spinal and pleural hairs are present, abdominal tergites II-IV in *korschelti* have mostly 12, very rarely including the small hairs up to 18 hairs, while in *taoi* there are normally 16, but up to 22 hairs. On the other hand the last rostral segment in *korschelti* has 11—18 hairs besides the 3 subapical pairs, but in *taoi* there are 8 hairs besides the subapical pairs. In alatae there is very little difference between *C. korschelti* and *C. taoi* spec. nov. The chaetotaxy of the rostrum differs as in apterae, the hair on the inner apex of antennal segment I in *C. taoi* is twice as long as the longest hair on segment III, while in *korschelti* that hair on segment I is not or only little longer than the longest hair on segment III. However, in siphunculi, antennae and dorsal ornamentation the two species are extremely similar, and clearly very nearly related.

In my (1953) revision of European *Cryptomyzus,* as a questionable synonym of *C. ribis* (L.) this aphid was quoted as *Capitophorus ribis* Tseng & Tao, 1936. Since then I received a slide of this species from Dr. C. C. TAO, with permission to describe the aphid. TAO (1963) refers to it as *Cryptomyzus taoi* H.R.L.

Cavariella takahashii spec. nov.

Alate viviparous female (rather heavily potashed).

Body about 2.25—2.30 mm long with indistinct central sclerotisation on posterior half of abdomen. Antennae very much like those of *C. japonica* Essig & Kuwana, but segment III slightly thicker, with 51—52 (3 antennae) tuberculate, bulging rhinaria, IV with 10—11, V with 3—5 secondary rhinaria; processus terminalis just longer than base of last segment; hairs on antennae short, about half basal diameter of segment III. Rostrum reaching to hind coxae; last segment 1.45 times second joint of hind tarsi, with 2 pairs of long hairs on basal half. Wings normal. Femora all with many long wavy hairs, most of which are $^2/_3$ or more of the halfway diameter of the femora, but with a number of spiny much shorter hairs on distal half similar to those on the tibiae. Siphunculi slightly tapering from the middle, more strongly so near base, not constricted or abruptly narrowed at apex, with very small flange, about $^2/_{15}$ length of body and about 6 times as long as their halfway width. Abdominal tergite VIII with the two spinal hairs close to each other, but without a trace of a supracaudal process. Cauda thick and very blunt, nearly half as long as the siphunculi, with 11—14 hairs.

Measurements in mm. Length body: 2.26; antenna: 1.48; antennal segments: III: 0.52, IV: 0.18, V: 0.13, VI: (0.13 + 0.15); siphunculus: 0.30; cauda: 0.14. Rhinaria on antennal segment III: 51 and ?; on IV: 11 and ?; on V: 3 and ?

Holotype. Alate viviparous female, from *Salix,* Yokohama, Japan, 30.IV.1918, leg. P. VAN DER GOOT. Paratype. Alate with the same data.

Notes. Notwithstanding the absence of a supracaudal process and its long femoral hairs, the species is not nearly related to *C. sapporoensis* Tak., 1961 and *C. oenanthi* Shinji, 1922[1]), which both possess very long siphunculi and dense, long hairs on the tibiae. The closest relative is *C. japonica* Essig & Kuwana, 1918 from which *takahashii* differs by a few more rhinaria on the somewhat thicker antennal segment III, by the shorter processus terminalis (more than 1.5 times base of VI in *japonica*), numerous long femoral hairs, long ventral hairs (longest on abdomen 0.030—0.043 mm in *japonica,* 0.060—0.082 mm in *takahashii*), apically not constricted siphunculi, and thick fingertip-shaped cauda with 11—14 hairs instead of conical cauda with 7—10 hairs.

The above species was collected in 1918 by P. VAN DER GOOT at Yokohama when he was on his way from Java to the Netnerlands, via Japan and Siberia. I sent it as undescribed to Dr. TAKAHASHI, who had not seen it before but unfortunately did not describe it and did not include it in his 1961 key to *Cavariella* of Japan. The original sample consisted of a mixture of *C. japonica* Essig & Kuwana with *C. takahashii* spec. nov.; a fundatrix and apterae seem to belong to *C. japonica.* There is a very small flaw in the key to alatae in TAKAHASHI (1961), where in couplet (2) *C. japonica* is keyed as having no long femoral hairs; mostly that species has one long hair on the underside near the middle of the fore femora in alatae.

Matsumuraja nuditerga spec. nov.

Apterous viviparous female.

Body small, only about 1.18—1.34 mm long. Capitate hairs only present on front, sides of pro and mesonotum and abdominal tergites VII and VIII; all other dorsal hairs minute, not capitate, and placed on normal, very inconspicuous sockets. Last rostral segment about 1.1 times as long as second joint of hind tarsi. Other characters more or less as in *Matsumuraja rubifoliae* Tak., as described by TAKAHASHI (1959).

Holotype and paratype. Apterous viviparous females, from *Rubus,* Nara, Osaka-Fu, Japan, 25.V.1964, leg. R. VAN DEN BOSCH, V-25g.

Notes. Japanese species of the genus were recently discussed by TAKAHASHI (1959), Formosan and continental Chinese species by TAO (1963). Material of *M. rubi* (Matsumara, 1918), *M. rubicola* Takahashi, 1927, and *M. rubifoliae* Takahashi, 1931, all identified by Dr. TAKAHASHI is available.

The present species differs strongly from the published descriptions of *Matsumuraja* species, but TAKAHASHI (1959, p. 57—58) in discussing *M. rubifoliae,* refers to the occasional absence or minute size of pleural and sometimes spinal hairs. It would seem therefore that I described abnormal specimens of the latter species. However, it appears that the embryos inside the apterae that I described above have the setal pattern of only capitate hairs on front and abdominal tergites

---

1) Spelled "oenauthi" in SHINJI (1941, p. 638), where possibly two species are mixed.

VII and VIII with exceedingly short hairs on the rest of the dorsum, whereas *rubifoliae* apterae with occasional short hairs have embryos with a full complement of capitate hairs from head to tail. The last rostral segment in *nuditerga* is only 1.1 times as long as the second joint of the hind tarsi as against 1.4 times in dwarfs of *rubifoliae*. Also in slightly higher frontal tubercles, longer and less variegated antennae and more slender siphunculi does *M. nuditerga* differ from *M. rubifoliae*.

Japanese species of **Takecallis** Matsumura, 1917

A number of *Myzocallis*-like aphids have been reported from Japan from grasses of the bamboo group. All seem to belong to *Takecallis* Mats., a genus characterized by adults having a fingertip-like processus on the clypeus.

1. *T. bambusae* Matsumura, 1917, type of *Takecallis* Mats., 1917, lives on the undersides of flat leaves. Material of that species from Japan cannot be distinguished from *Callipterus arundicolens* Clarke, 1903, and *bambusae* must be considered a synonym. *T. arundicolens* (Clarke) was described from California, but it also occurs in England, Switzerland, Mediterranean France, Italy, Bulgaria, and Japan.

2. *T. arundinariae* (Essig, 1917), was described as a *Myzocallis* from California. I also saw material from North Carolina and England. *Myzocallis bambusifoliae* Tak., 1921, from Formosa and Japan, may be a synonym but I have not seen material from that area. It lives, like the preceding species, on flat leaves.

3. *T. sasae* (Matsumura, 1917) was described as a *Myzocallis*. The species has apparently not been found outside Japan. The original description gives the colour as yellowish green and this is one respect in which it differs from the next species which in life is bright green. According to Dr. VAN DEN BOSCH who collected it in Japan, the insects live on the youngest, tender, rolled leaves or shoots.

4. *T. taiwana* (Takahashi, 1926) was first recorded by TAKAHASHI (1925) from Formosa as *Myzocallis sasae* Mats., later given the name *Myzocallis taiwana*. It infests the same parts of the hosts as the preceding species. Both *taiwana* and *sasae* were collected by Dr. VAN DEN BOSCH in Japan, and in slides they are extremely similar. However, specimens identified by the late Dr. TAKAHASHI as *T. sasae* Mats., and similar ones collected by Dr. VAN DEN BOSCH near Wakayama City, have very little contrast in the ornamentation of the flagellum of the antennae, and the hairs on the outer side of the hind tibiae are near its middle very long and fine, about 0.044 mm, while in *T. taiwana* these hairs are about 0.026 mm or shorter. *T. taiwana* is widely distributed. It was described as *Therioaphis tectae* Tissot, 1932, from *Arundinaria tecta* in Florida. I saw it in North Carolina; in Europa it was found in England, Southern France, the Crimea; it occurs also in South Africa. Material from the mentioned areas including paratypes of *tectae* was examined; the specimens closely agree in the length of the tibial hairs.

REFERENCES

ESSIG, E. O. & S. I. KUWANA, 1918. Some Japanese Aphididae. Proc. Calif. Acad. Sc. [4] 8 : 36—112.

HILLE RIS LAMBERS, D., 1953. Contributions to a monograph of the Aphididae of Europe, V. Temminckia 9 : 1—176.

MATSUMURA, S., 1917. A list of the Aphididae of Japan, with description of new species and genera. Journ. Coll. Agric. Tohoku Imp. Univ. Sapporo 7 : 351—414.

———, 1918. New Aphidinae of Japan. Trans. Sapporo Nat. Hist. Society 7 : 1—22.

MORDVILKO, A., 1919. Aphidodea. Faune d.l. Russie; Ins. Hémiptères 1, livr. 2 : 237—508.

MORITSU, M., 1947. Four gall-forming aphids on cherry trees in Japan. Mushi 18 : 39—48.

———, 1948. The genus Megoura Buckton in Japan, with a note on the variation of the external characters in Megoura viciae japonica (Matsumura). Mushi 18 : 83—88.

OKAMOTO, H. & R. TAKAHASHI, 1927. Some Aphididae from Corea. Ins. Matsumurana 1 : 131—148.

SHINJI, O., 1941. Monograph of Japanese Aphididae (in Japanese). Tokyo : 1—1215.

TAKAHASHI, R., 1924. Aphididae of Formosa, part 3 : 1—121.

———, 1925. Aphididae of Formosa, part 4 : 1—65.

———, 1959. On the aphid Matsumuraja rubifoliae Takahashi (Homoptera: Aphididae). Trans. Shihoku Ent. Soc. 6 : 55—58.

———, 1961. Cavariella of Japan (Aphididae, Homoptera). Bull. Univ. Osaka Pref., [B] 12 : 1—11.

———, 1963. Eumyzus, Paramyzus, Macromyzus, Sitomyzus, Micromyzus, and Micromyzodium of Japan (Homoptera; Aphididae). Ins. Matsumurana 26 : 55—63.

TAO, Ch. CHIA-CHU, 1962. Revision of Chinese Aphinae. Plant Protection Bull. (Taiwan) 4, no. 3 : 95—110.

———, 1963. Revision of Chinese Macrosiphinae (Aphidae, Homoptera). Plant Protection Bull. (Taiwan) 5, no. 3 : 162—205.

UYE, T., 1923. New species of Japanese Aphididae (in Japanese). Insect World 27 : 3—5.

Tijdschrift voor Entomologie

Het verschijnt in één deel van 350—450 bladzijden per jaar, bestaande uit enkele afleveringen.

Entomologische Berichten

Deze zijn bestemd voor de publicatie van kortere artikelen, faunistische notities etc., alsmede van de Verslagen der Vergaderingen en van mededelingen van het bestuur. Zij verschijnen twaalf maal per jaar in een aflevering van 16 of meer bladzijden, die samen een deel vormen.

Trichopterorum Catalogus

Deze Catalogus van F. C. J. Fischer wordt door de Vereeniging voor rekening van de auteur uitgegeven. Alle bekende recente en fossiele soorten van de gehele wereld met hun synoniemen worden er in behandeld. Delen I en II kosten f 39.— per stuk, delen III—V: f 45.—. Er zullen in totaal 15 delen verschijnen. Van alle delen zijn ook éénzijdig bedrukte exemplaren beschikbaar. De prijsverhoging hiervoor bedraagt f 2.50.

Entomologia Experimentalis et Applicata

Dit tijdschrift wordt uitgegeven door de Noord-Hollandse Uitgevers Maatschappij te Amsterdam in opdracht van de Vereeniging. Het publiceert artikelen over experimentele biologie en oekologie bij insecten en andere land-arthropoden. Het verschijnt vier maal per jaar en bevat 320 bladzijden. De prijs voor leden bedraagt f 25.—, voor niet-leden f 40.— per jaar.

Alle zakelijke correspondentie betreffende de Vereeniging te richten aan de Secretaris, W. Hellinga, Weesperzijde 23II, Amsterdam-O.

Alle correspondentie over de redactie van het Tijdschrift voor Entomologie en de Monographieën te richten aan de Redacteur, Dr. A. Diakonoff, Rijksmuseum van Natuurlijke Historie, Leiden.

Alle correspondentie over de redactie van de Entomologische Berichten te richten aan de Redacteur, B. J. Lempke, Oude IJselstraat 12III, Amsterdam-Z. 2.

Alle correspondentie over de redactie van Entomologia Experimentalis et Applicata te richten aan de Redacteur, Dr. P. A. van der Laan, Lab. voor Toegepaste Entomologie, Linnaeusstraat 2 B, Amsterdam.

Alle betalingen te richten aan de Penningmeester, Drs. H. Wiering, Doorntjes 29, Bergen (N.H.), postgiro 188130, ten name van de Nederlandsche Entomologische Vereeniging te Bergen (N.H.).

Alle correspondentie betreffende de Bibliotheek der Vereeniging te richten aan de Bibliotheek, Zeeburgerdijk 21, Amsterdam-O.

Notice to Subscribers

All correspondence referring to subscriptions and exchange of the periodicals of the Netherlands Entomological Society should be addressed to the Librarian, Zeeburgerdijk 21, Amsterdam-O, Netherlands.

NOTICE TO CONTRIBUTORS

Contributors will receive free of charge fifty reprints of their papers, joint authors have to divide this number between them at their discretion. Additional reprints may be ordered when returning proofs.

Manuscripts should be written in Dutch, English, French, German or Italian. If they contain descriptions of new genera, species, etc., they should be in one of the four last mentioned languages.

The author should communicate with the editor before submitting his manuscript. He will enclose with manuscript a Synopsis (Abstract), styled according to recommendations of the UNESCO (style rules will be provided by the editor) and, if needed, a Summary. Papers in Dutch should contain an Abstract and/or a Summary in one of the four other languages.

Manuscripts should be typewritten in double spacing on only one side of the paper, with a margin of at least three cm at the left side of each sheet. Paragraphs should be indented. Carbon copies cannot be accepted, as handling makes them illegible.

Captions for text figures and plates should be written on a separate sheet in double spacing, numbered consecutively in arabic numerals; the use of a, b, c, or any other subdivision of the figure numbering should be avoided.

Drawings for reproduction should be on good paper in Indian ink, preferably at least one and a half times as large as the ultimate size desired. Lettering should be uniform, and, after reduction, of the same size. Photographs should be furnished as shiny positive prints, unmounted. Plates should be arranged so as to fill a whole page (11.5 x 19 cm) of the *Tijdschrift,* or a portion thereof, captions included. Combinations of illustrations into groups are preferable to separate illustrations, since there is a minimum charge per block.

Names of genera and lower systematic categories, new terms and the like are to be underlined by the author in the manuscript by a single straight line. Any other directions as to size or style of the type are given by the editors, not by the author. Italic type or spacing to stress ordinary words or sentences is to be avoided. Dates should be spelled as follows: either "10.V.1948" or "10 May, 1948". Other use of latin numerals should be avoided, as well as abbreviations in the text, save those generally accepted. Numbers from one to ten occurring in the text should be written in full, one, two, three, etc. Titles must be kept short. Footnotes should be kept at a minimum.

Bibliography should not be given in footnotes but compiled in a list at end of the paper, styled as follows:

Mosley, M. E., 1932, "A revision of the European species of the genus *Leuctra* (Plecoptera)". — Ann. Mag. Nat. Hist. [10] 10 (3): 1—41, pl. 1—5, fig. 1—57. Number of issue should only be added (in parentheses) when it has individual pagination.

Text references to this list might be made thus:

"Mosley (1932) says...." or "(Mosley, 1932)".

The editors reserve the right to adjust style to certain standards of uniformity.

Manuscripts and all communications concerning editorial matters only should be sent to: Dr. A. DIAKONOFF, Rijksmuseum van Natuurlijke Historie, Leiden, The Netherlands.

DEEL 108 AFLEVERING 8 1965

TIJDSCHRIFT VOOR ENTOMOLOGIE

UITGEGEVEN DOOR

DE NEDERLANDSCHE ENTOMOLOGISCHE VEREENIGING

INHOUD:

Tijdschrift voor Entomologie, deel 108, afl. 8. Gepubliceerd 17-IX-1965

De contributie voor het lidmaatschap bedraagt f 15.—, voor student-leden f 2.50, per jaar. — Begunstigers betalen jaarlijks tenminstet f 15.—.

De leden, behalve de student-leden, ontvangen gratis de *Entomologische Berichten,* waarvan de prijs voor student-leden f 1.50 per jaar, voor niet-leden f 20.— per jaar en f 2.— per nummer bedraagt.

De leden kunnen zich voor f 10.— per jaar abonneren op het *Tijdschrift voor Entomologie*; hiervan bedraagt de prijs voor niet-leden f 35.— per jaar.

De eerder verschenen publicaties der Vereeniging zijn voor de leden tegen verminderde prijzen verkrijgbaar. De Vereeniging geeft de volgende publicaties uit.

MONOGRAPHIEËN VAN DE NEDERLANDSCHE ENTOMOLOGISCHE VEREENIGING

Deze worden met onregelmatige tussenpozen uitgegeven. Er zijn reeds verschenen:

— F. T. Valck Lucassen et al. — Monographie du genre Lomaptera Gory & Percheron (Coleoptera, Cetoniidae), prijs f 50.—.

1. A. J. Besseling. — De Nederlandse Watermijten (Hydrachnellae Latreille, 1802), prijs f 25.—.

SYNONYMICAL NOTES ON NEW WORLD WASPS OF THE SUBFAMILY SPHECINAE (HYMENOPTERA, SPHECIDAE)

BY

A. S. MENKE
University of California, Davis, U.S.A.*)

ABSTRACT

The following new synonymy is proposed: *Sphex flavipes* Smith, 1856 and *hirsutus* Saussure, 1867 = *Sphex flavovestitus* Smith, 1856; *Sphex croesus* Lepeletier, 1845 and *ichneumoneus ignota* Strand, 1916 = *Sphex ichneumoneus* (Linnaeus), 1758; *Sphex beata* Cameron, 1888 and *neotropicus* Kohl, 1890 = *Sphex nitidiventris* Spinola, 1853; *Sphex caliginosa* Erichson, 1848 and *erythroptera* Cameron, 1888 = *Sphex fusca* Lepeletier, 1845 (preoccupied, = *caliginosus*); *Sphex clypeata* Smith, 1856 = *Sphex latro* Erichson, 1848; *Sphex pensylvanicus robustisoma* Strand, 1916 = *Sphex pensylvanicus* Linnaeus, 1763; *Sphex servillei* Lepeletier, 1845 and *chichimecus* Saussure, 1867 = *Sphex fuliginosus* Dahlbom, 1843; *Sphex proxima* Smith, 1856 and *funestus* Kohl, 1890 = *Sphex difficilis* Spinola, 1853; *Sphex aztecus digueti* Berland, 1926 = *Isodontia philadelphica* (Lepeletier), 1845; *Sphex robusta* Cameron, 1889 = *Isodontia azteca* (Saussure), 1867; *Ammophila mutica* Dahlbom, 1845, *moneta* Smith, 1856, and *fragilis* Smith, 1856 = *Ammophila gracilis* Lepeletier, 1845.

Sphex guatemalensis Cameron, *tinctipennis* Cameron, and *Isodontia costipennis* (Spinola) are recognized as valid species.

Lectotypes are designated for many species and in addition to the species listed above, taxonomic and/or nomenclatorial notes are given for the following: *Sphex opacus* Dahlbom, *prosper* Kohl, *melanopus* Dahlbom, *latreillei* Lepeletier, *Palmodes dimidiatus* (De Geer), *Chlorion viridicoeruleum* Lepeletier and Serville, *hemiprasinum* (Sichel), *hemipyrrhum* (Sichel), *Ammophila binodis* (Fabricius), *auromaculata* Perez, *eximia* Lepeletier, and *Podalonia violaceipennis* (Lepeletier).

Introduction

Recent studies of types of sphecine species have revealed some new synonymy and also made possible the selection and designation of lectotypes for some. Probably the most important aspect of my investigations has been the identification of some of the Western Hemisphere wasps described by LEPELETIER and SPINOLA, a few of which have gone unrecognized since they were described. Most SPINOLA wasp types, as well as many of LEPELETIER's, are in the SPINOLA Collection in Turin, Italy. Much of the material in this collection is unlabelled, that is, there are no labels on the pins. Instead, the specimens of each species are pinned in front of large, rectangular, colored labels which bear the name and author of the species, and often the word "type", presumably indicating that these are the types of the species involved. Some labels have additional information such as the name of the

* The support of a Grant-in-Aid from Sigma Xi-RESA is gratefully acknowledged.

collection from which SPINOLA obtained the insects ("coll. LATREILLE", "coll. SERVILLE", etc.). Although the majority of LEPELETIER's species are represented by material in the collection, only about half can definitely be said to be true types. Some specimens do not agree with the original description, or in other cases the data on the labels do not agree with those cited by the author of the species. This latter discrepancy makes it difficult to decide whether or not specimens should be considered as types even though they fit the original description perfectly. However, in most cases I have accepted these specimens as types with the belief that labelling errors are involved. I have taken this perhaps unsound course of action primarily because, at least in the case of LEPELETIER types, the specimens in Turin are probably as close to being true types as will be found.

Acknowledgements

During the summer of 1964 I visited several important European collections. To the following curators I extend my appreciation for their assistance during my visits: SIMONE KELNER-PILLAULT, Muséum National d'Histoire Naturelle, Paris; GUIDO BACCI, Instituto e Museo di Zoologia, Università di Torino, Turin; DELFA GUIGLIA, Museo Civico di Storia Naturale, Genoa; and J. F. PERKINS and I. H. H. YARROW, British Museum (Natural History), London.

Type material has also been borrowed from a number of institutions. I would like to thank the following people for the loan of types: MAX FISCHER, Naturhistorisches Museum, Vienna (KOHL types); EBERHARD KÖNIGSMANN, Zoologisches Museum der Humboldt Universität, Berlin (DAHLBOM and ERICHSON types); JOACHIM OEHLKE, Deutsches Entomologisches Institut, Eberswalde (STRAND types); CLAUDE BESUCHET, Muséum d'Histoire Naturelle, Geneva (DE SAUSSURE types); IVOR LANSBURY, University Museum, Oxford (SMITH type); and HUGO ANDERSSON, Lunds Universitets Zoologiska Institution, Lund (DAHLBOM types).

Systematics

Sphex opacus Dahlbom (fig. 8)

Sphex opaca Dahlbom, 1845. Hymen. Europaea 1 (fasc. 3): 437. Holotype ♂, "Americ. Merid." (Lund Universitets Zoologiska Institution, Lund).

Sphex flavipes iheringii Kohl, 1890. Ann. Naturhist. Hofmus. Wien 5 : 207. Lectotype ♂, Rio Grande do Sul, Brazil (Naturhistorisches Museum, Vienna), present designation.

I have examined the types of *opacus* and *iheringii* and can verify that SCHULZ (1912) and FERNALD (1931) correctly synonymized the two species. *Sphex opacus* closely resembles the typical color form of *S. flavovestitus* Smith but the latter does not occur within the range of *opacus* (southern Mexico to Argentina). Mexican *flavovestitus* are differently colored and are easily separated from *opacus* (see discussion under *flavovestitus*). In male *opacus* the broad fossulae on flagellomeres IV—VI which extend the full length of each flagellomere, the elongate thumb-like median projection of the last sternite (fig. 8), and appressed golden hair on the gena, are distinctive features. The male genitalia of the two species are totally different. Female *opacus* differ from *flavovestitus* in having silver instead of gold

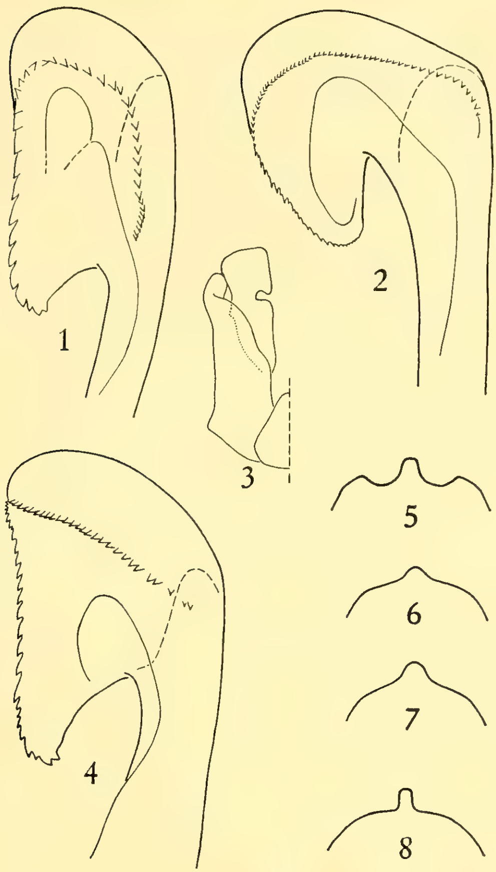


Fig. 1—2. Lateral view of head of dissected aedeagus of *Sphex nitidiventris* and *Sphex prosper* (lectotype), respectively. Fig. 3. Volsella of *Sphex prosper* (lectotype). Fig. 4. Lateral view of head of dissected aedeagus of *Sphex tinctipennis*. Fig. 5—8. Apical outline of male subgenital plate of *Sphex prosper* (lectotype), *tinctipennis, nitidiventris,* and *opacus,* respectively

appressed hair on the propodeum above the petiole socket. Also, female *opacus* usually have appressed gold hair on the gena.

Sphex guatemalensis Cameron

Sphex guatemalensis Cameron, 1888. Biologia Centrali-Americana, Hymen. 2 : 32. Lectotype ♀, San Geronimo, Guatemala (British Museum, London), present designation.

CAMERON described *guatemalensis* from a male and female; however, I could find only the female and a slide of the male genitalia in London. The male genitalia of this species do not appear to differ from *S. opacus* Dahlbom suggesting that *guatemalensis* is merely a color form of DAHLBOM's species. SCHULZ (1912) and FERNALD (1906) considered *guatemalensis* as a subspecies of *opacus.*

Apparently however, the ranges of the two overlap in southern Mexico without intergradation of hair and body color which leads me to suspect that they are distinct species. The lectotype female of *guatemalensis* and a male in my collection from Hujintlan, Morelos, Mexico, have clear wings, and dense, bright golden, erect body hair in contrast to the infumate wings, and paler body hair of Mexican *opacus*. Furthermore, unlike *opacus, guatemalensis* has gold appressed hair on the propodeal enclosure and around the petiole socket. The appressed pleural hair in *guatemalensis* is golden and much more extensive than in *opacus*. The gaster in the lectotype of *guatemalensis* is black but reddish ventrally. In the Hujintlan male the gaster is red except for the first tergite and a triangular black spot on the second tergite.

Sphex guatemalensis is similar to the Mexican color form of *S. flavovestitus* Smith but the wings are yellowish in the latter and the propodeal enclosure lacks appressed golden hair. The flagellomere and sternite characters in *guatemalensis* are identical with *opacus* and thus serve to separate males of the former from *flavovestitus* (see discussion under *opacus*).

Sphex flavovestitus Smith

Sphex flavovestita Smith, 1856. Cat. Hymen. Insect. Coll. Brit. Mus. 4 : 253. Holotype ♂, "India" (British Museum, London).

Sphex flavipes Smith, 1856. Cat. Hymen. Insect. Coll. Brit. Mus. 4 : 263. Holotype ♀, Georgia (British Museum, London). Preoccupied by *Sphex flavipes* Fabricius, 1781. **New synonymy.**

Sphex hirsutus Saussure, 1867. Reise Oesterreich. Fregatte Novara, Hymen. 2 : 40. Lectotype ♂, Orizaba, Mexico (Muséum d'Histoire Naturelle, Geneva), present designation. Preoccupied by *Sphex hirsutus* Scopoli, 1763. **New synonymy.**

Chlorion flavitarsis Fernald, 1906. Proc. U. S. Nat. Mus. 31 : 379. New name for *flavipes* Smith, 1856.

Chlorion flavitarsis saussurei Fernald, 1906. Proc. U. S. Nat. Mus. 31 : 381. New name for *hirsutus* Saussure, 1867.

Sphex flavitarsis (Fernald) of Bohart & Menke, 1963. Univ. Calif. Pub. Entomol. 30 : 121.

Fernald (1931) erroneously stated that *flavovestita* Smith was synonymous with *opacus* Dahlbom. I have examined the types of both names and they represent two different species. *Sphex flavovestitus* is conspecific with the type of the eastern North American wasp *Sphex flavipes* Smith, currently known as *flavitarsis* (Fernald). In the United States *flavovestitus* has infumate wings with dark veins, but Mexican specimens have yellowish wings with pale veins. This latter color form was described by de Saussure under the preoccupied name *hirsutus* which Fernald subsequently renamed *saussurei*. I have studied de Saussure's syntypes and selected a male as lectotype. The type locality for *flavovestitus*, "India", is certainly a labelling error.

Sphex ichneumoneus (Linnaeus)

Apis ichneumonea Linnaeus, 1758. Systema Natur., 10th. ed., p. 578. Lectotype ♀, Surinam (Naturhistoriska Riksmuseet, Stockholm), designated by Bohart & Menke, 1963.

Sphex croesus Lepeletier, 1845. Hist. Natur. Insect., Hymen. 3 : 351. Holotype ♀, Amerique Septentrionale (type lost). **New synonymy.**

Sphex ichneumoneus ignota Strand, 1916. Archiv Naturges. [A] 81 : 99. Holotype ♀, Colombia (Deutsches Entomologisches Institut, Eberswalde). New synonymy.

I examined a female labelled "*Sphex croesus* Lep." in SPINOLA's collection which agrees with LEPELETIER's description of *croesus* except for a red petiole. This discrepancy would seem to eliminate this specimen as the type of *croesus*. In addition, red petiolate *ichneumoneus* are of South American origin and *croesus* was described from North America. In any case, the original description leaves little doubt that *croesus* is a synonym of *ichneumoneus*.

The type of *ignota* Strand is the typical South American form of *ichneumoneus*, e.g., petiole red, and terminal gastral segments black. The wings are amber and the veins are dark brown.

Sphex tinctipennis Cameron (fig. 4, 6)

Sphex tinctipennis Cameron, 1888. Biologia Centrali-Americana, Hymen. 2 : 32. Lectotype ♀, El Tumbador, Guatemala (British Museum, London), present designation.

KOHL (1890) regarded *tinctipennis* as a synonym of *S. brasilianus* Saussure, but the former has completely black legs while the latter has partially red legs. Until the type of *brasilianus* can be studied it seems best to regard *tinctipennis* as a valid species. CAMERON described *tinctipennis* from several females collected in Guatemala and Costa Rica but I could only find a Guatemalan female and have selected it as lectotype. The male of this species has not been recognized although KOHL (1895) described a red legged male which he believed to be the male of *brasilianus*. I have seen a female of *tinctipennis* from Vitoria do Mearim, Maranhao, Brazil and a male from the same locality which appears to be the other sex of this species. This male is similar to the female except that the spots and bands of appressed hair are more extensive and the erect hair is denser. Flagellomeres IV—VI bear narrow, elongate oval fossulae which occupy only the basal half of each flagellomere. The penis valve head and subgenital plate are illustrated by figures 4 and 6, respectively. Male *tinctipennis* resemble the all black color form of male *S. dorsalis* Lepeletier, but in the latter only flagellomeres V—VI have fossulae and the aedeagus is different (see figures 75, 81 in BOHART & MENKE, 1963; mislabelled as *nudus*).

I have seen female *tinctipennis* from Mexico to Brazil.

Sphex nitidiventris Spinola (fig. 1, 7)

Sphex nitidiventris Spinola, 1853. Mem. Reale Accad. Torino [2] 13 : 53. Lectotype ♀, Pará, Brazil (Università di Torino, Turin), present designation.

Sphex beata Cameron, 1888. Biologia Centrali-Americana, Hymen. 2 : 31. Lectotype ♀, Pantaleon, Guatemala (British Museum, London), present designation. New synonymy.

Sphex neotropicus Kohl, 1890. Ann. Naturhist. Hofmus. Wien 5 : 420. Syntypes ♂, ♀, Bahia, Brazil; Rio Grande do Sul, Brazil (Naturhistorisches Museum, Vienna). New synonymy.

KOHL's description of *neotropicus* compares very well with my homotype of *nitidiventris*. My studies of the type of *beatus* indicate that it is merely a Central

American bicolored form of the totally black South American *nitidiventris.* Typical *nitidiventris* is shiny black with infumate wings, black erect body hair, and the body does not have silver or golden appressed hair except occasionally on the face. Specimens from Panama to Mexico become progressively more colorful northward. In these the front and sometimes the middle femora and tibiae are red, the erect head hair is coppery or golden, and the appressed head and scutal hair is similarly colored. In Mexican examples the erect propodeal hair is pale. The penis valve head and subgenital plate are shown by figures 1 and 7, respectively.

I have selected one of SPINOLA's two female syntypes of *nitidiventris* as lectotype. CAMERON described *beatus* from a male and female but only the female could be found.

Sphex prosper Kohl (fig. 2, 3, 5)

Sphex prosper Kohl, 1890. Ann. Naturhist. Hofmus. Wien 5 : 426. Lectotype ♂, Venezuela (Naturhistorisches Museum, Wien), present designation.

This species is known only by the male and female syntypes from Venezuela. I have selected the male as lectotype. *Sphex prosper* is entirely black and the body is covered with dense, pale, erect hair. The only appressed hair occurs on the frons and is silver. The wings are strongly infumate. The antennae in the male are not intact but one has five flagellomeres. Flagellomeres IV—V bear moderately broad fossulae which end just short of the apex of each flagellomere. The penis valve head, volsella and subgenital plate of the lectotype are shown by figures 2, 3, 5, respectively.

Sphex caliginosus Erichson

Sphex fusca Lepeletier, 1845. Hist. Natur. Insect., Hymen. 3 : 335. Lectotype ♀, "Sans Patrie" (Brazil on label) (Università di Torino, Turin), present designation. Preoccupied by *Sphex fusca* Linnaeus, 1761.

Sphex caliginosa Erichson, 1848. In Schomburgk, Reisen Britisch-Guiana Jahr. 1840—1844 3 : 589. Lectotype ♂, British Guiana (Brazil on label) (Humboldt Universität, Berlin), present designation. **New synonymy.**

Sphex erythroptera Cameron, 1888. Biologia Centrali-Americana, Hymen. 2 : 30. Lectotype ♂, Orizaba, Mexico (British Museum, London), present designation. **New synonymy.**

Two females in SPINOLA's collection are probably the types of *fusca* Lepeletier. However, the label beneath the specimens reads "Bresil". LEPELETIER's description says "sans patrie". In spite of this discrepancy the specimens fit the original description perfectly and I have selected one female as lectotype.

KOHL (1890) and FERNALD (1906) have already indicated the synonymy of *erythroptera* with *caliginosa.* Two males and four females of *caliginosa* were sent to me from Berlin that are probably the syntypes of this species. I have selected a male bearing a large green label, "*caliginosa,* N., Brasil", as lectotype. This is a J. KLUG manuscript label and ERICHSON attributes the name *caliginosa* to KLUG in the original description. No definite type locality was given by ERICHSON but presumably it was British Guiana. However, none of the lectoparatypes give this

locality. Some have no labels but two are labelled "Cayenne" and "St. Thom." in KLUG's handwriting. Several syntypes of *erythroptera* from various localities were found in the British Museum. A male has been selected as lectotype.

Sphex latro Erichson

Sphex latro Erichson, 1848. In Schomburgk, Reisen British-Guiana Jahr. 1840—1844 3 : 588. Lectotype ♂, British Guiana (Humboldt Universität, Berlin), present designation.

Sphex clypeata Smith, 1856. Cat. Hymen. Insect. Coll. Brit. Mus. 4 : 257. Holotype ♂, Brazil (British Museum, London). New synonymy.

Sphex roratus Kohl, 1890. Ann. Naturhist. Hofmus. Wien 5 : 417. Syntypes, ♂, ♀, Bahia, Brazil; Cayenne, French Guiana (Naturhistorisches Museum, Vienna). Synonymy teste KOHL, 1895, and FERNALD, 1931.

One male and two female syntypes of *latro* exist. The male bears a label that reads "*latro* Er., Br. Guy., Schomb." (in ERICHSON's handwriting). KOHL placed another label on this specimen that says "= *roratus* Kohl". I am selecting this male as lectotype. The two females have no labels. I have studied SMITH's holotype of *clypeatus* and it is identical with *latro*.

Sphex pensylvanicus Linnaeus & Johannson

Sphex pensylvanica Linnaeus & Johannson, 1763. Centuria Insect. Rar., p. 30. Holotype ♀, Pennsylvania (British Museum, London).

Sphex pensylvanicus robustisoma Strand, 1916. Archiv Naturges. [A] 81 : 101. Holotype ♀, "Patria?" (Deutsches Entomologisches Institut, Eberswalde). New synonymy.

The type of *robustisoma* is a typical specimen of *pensylvanicus*.

Sphex fuliginosus Dahlbom

Sphex fuliginosa Dahlbom, 1843. Hymen. Europaea 1 (fasc. 1): 25. Lectotype ♀, Brazil (Humboldt Universität, Berlin), present designation.

Sphex servillei Lepeletier, 1845. Hist. Natur. Insect., Hymen. 3 : 336. Holotype ♂, Brazil (Università di Torino, Turin). New synonymy.

Sphex chichimecus Saussure, 1867. Reise Osterreich. Fregatte Novara, Hymen. 2 : 40. Lectotype ♂, Orizaba, Mexico (Muséum d'Histoire Naturelle, Geneva), present designation. New synonymy.

Sphex congener Kohl, 1890. Ann. Naturhist. Hofmus. Wien 5 : 418. Syntypes, ♀, Bahia, Brazil; Rio Grande do Sul, Brazil (Naturhistorisches Museum, Vienna). Synonymy teste KOHL, 1895.

Sphex jorgenseni Brèthes, 1913. Anal. Mus. Nac. Buenos Aires 24 : 120. Holotype ♂, Mendoza, Argentina (Museo Nacional de Ciencias Naturales, Buenos Aires). Synonymy teste WILLINK, 1951.

When DAHLBOM described *fuliginosus* he had before him specimens of two different species. One was from "Tranquebar" (India) and the other from "Brazil". It seems clear however, that DAHLBOM intended the Brazilian material to represent *fuliginosus* because in his key to species on page 436 of Hymenoptera Europaea he cited only Brazil under this name. The Tranquebar specimens, two females, are in DAHLBOM's collection in Lund, Sweden. They appear to be *Sphex*

luteipennis Mocsary (? = *diabolicus* Smith). The Brazilian syntypic material of *fuliginosus* is in Berlin and consists of three males and one female. I have selected the female as lectotype. The only label on this specimen reads "= *Sphex congener* Kohl" (in KOHL's handwriting).

One of the syntype males bears an ERICHSON handwritten label which reads "*fuliginosa* M. Dahlb.", and a KLUG label which reads "*fuliginosa* N., Brasil". In support of not selecting this specimen as lectotype it must be pointed out that the males of *fuliginosa* have brownish wings with a very slight yellow tint. DAHLBOM, in the original description, clearly stated that the wings were yellow, a characteristic of the female. Furthermore, he did not mention the male sex.

A male in the SPINOLA Collection is labelled "*Sphex servillei* Le Pell., typus, coll. Serville, Bresil". It is synonymous with *fuliginosus.* I have seen three male syntypes of *chichimecus* from Orizaba, Mexico. They are the same as *fuliginosus* except that the erect body hair is pale. South American male *fuliginosus* have black erect hair.

Sphex fuliginosus is very similar to *pensylvanicus* and studies of the male genitalia have disclosed no apparent differences. The former occurs from southern Mexico to Argentina while the latter is known from extreme northern Mexico and over most of the United States. The only differences between the two species appears to be color. *Sphex pensylvanicus* is totally black with strongly infumate wings. Males have some appressed silver facial hair. *Sphex fuliginosus* has yellow wings in the female and lightly infumate wings in the male. Both sexes have silver faces, genae, pronotal lobes, and small silver spots on the pleura. Some males have appressed silver hair on top of the collar and in the scutal furrows. Erect body hair is black except in Mexican males.

In view of the structural similarities between *pensylvanicus* and *fuliginosus* it is tempting to consider them conspecific. However, since a large gap exists between the known ranges of the two entities, and also because of the color differences, it seems advisable at this time to recognize both as distinct species.

Sphex melanopus Dahlbom

Sphex melanopa Dahlbom, 1843. Hymen. Europaea 1 (fasc. 1): 27. Holotype ♂, Brazil (Lunds Universitets Zoologiska Institution).

Sphex ruficauda Taschenberg, 1869. Zeitsch. Ges. Naturwiss. Halle 34 : 418. Holotype ♂, "Amer. Merid." (Martin Luther Universität, Halle). Synonymy teste MENKE, 1963.

Recently I stated (MENKE, 1963) that the type of *melanopus* was in Berlin. This was based on the authority of KOHL (1895) and FERNALD (1931). However, DAHLBOM, in his original description, said that the unique type of *melanopus* was in Lund. I have recently studied the Lund specimen and it fits the current interpretation of DAHLBOM's species. *Sphex proxima* Smith was considered as synonymous with *melanopus* by FERNALD (1931) but my studies of the type indicate that it is a synonym of *S. difficilis* Spinola.

Sphex difficilis Spinola

Sphex difficilis Spinola, 1853. Mem. Reale Accad. Torino [2] 13 : 54. Holotype ♀, Pará, Brazil (Università di Torino, Turin).

Sphex proxima Smith, 1856. Cat. Hymen. Insect. Coll. Brit. Mus. 4 : 258. Holotype ♀, Brazil (British Museum, London). New synonymy.

Sphex funestus Kohl, 1890. Ann. Naturhist. Hofmus. Wien 5 : 397. Syntypes, ♀, Bahia, Brazil; Surinam; Demerara, British Guiana (Naturhistorisches Museum, Vienna). New synonymy.

I have studied the types of *difficilis* and *proxima* and they are the same as the species currently called *funestus* Kohl. *Sphex difficilis* is morphologically very similar to *S. melanopus* Dahlbom but the wings are strongly infumate and there is little or no appressed gold hair on the mesosoma in the former. In contrast, the wings of *melanopus* are clear and the mesosoma is densely covered with appressed gold hair especially on the collar, scutal furrows, propodeal enclosure, pronotal lobe and on the mesopleura behind the pronotal lobe. In view of the geographic variation in wing color and pubescence found in other Neotropical *Sphex* species it is possible that *difficilis* and *melanopus* will prove to be synonymous. The male of *difficilis* is unknown. *Sphex proxima* Smith is merely a color form of *difficilis* in which the gaster is red.

Sphex latreillei Lepeletier

Sphex latreillei Lepeletier, 1831. Guerin's Mag. Zool. 1 : 33. Holotype ♂, Chile (Museo Civico di Storia Naturale, Genoa).

Sphex thunbergi Lepeletier, 1831. Guerin's Mag. Zool. 1 : 34. Holotype ♀, Chile (type lost).

Sphex chilensis Lepeletier, 1845. Hist. Natur. Insect., Hymen. 3 : 341. Holotype ♀, Chile (type lost).

I found a male wasp in Genoa labelled: "*Sphex latreillei* L. Farg., Mag. Z., du Chili" and "coll. Guerin". It seems probable that this is the type of *latreillei.* I was unable to find specimens in Turin, Genoa, or Paris that could be positively identified as types of *chilensis* or *thunbergi.*

Isodontia (Isodontia) philadelphica Lepeletier

Sphex philadelphica Lepeletier, 1845. Hist. Natur. Insect., Hymen. 3 : 340. Holotype ♀, Pennsylvania (Università di Torino, Turin).

Sphex aztecus digueti Berland, 1926. Bull. Mus. Hist. Natur. 32 : 283. Holotype ♀, Basse-Mixtèque, Oaxaca, envir. Sylacayoapam (Muséum National d'Histoire Naturelle, Paris). New synonymy.

There is a female *Isodontia* in the SPINOLA collection that is in front of the following label: "*Sphex caerulea* Lep.?, Coll. Latr., Philadelphie". This is the specimen considered by BOHART and MENKE (1963) as the type of *philadelphica.* However, LEPELETIER stated that this type came from SERVILLE's collection so that the "*caerulea*" specimen may not be the type of *philadelphica.* Nevertheless, this specimen agrees with the original description very well. The type of *digueti* is typical *philadelphica.* The type locality of *digueti* extends the known range of *philadelphica* well into Mexico. Previously this species was known from the United States.

Isodontia (Isodontia) azteca (Saussure)

Sphex aztecus Saussure, 1867. Reise Osterreich. Fregatte Novara, Hymen. 2 : 38. Syntypes, ♂, ♀, Cordova, Mexico (Muséum d'Histoire Naturelle, Geneva).

Sphex robusta Cameron, 1889. Biologia Centrali-Americana, Hymen. 2 : 33. Lectotype ♀, N. Yucatan, Mexico (British Museum, London). New synonymy.

The specimen I have selected as lectotype for *robusta* compares very well with notes taken by R. M. BOHART on the syntypes of *azteca. Isodontia azteca* is known only from Mexico. It is similar to the North American *I. apicalis* (Smith) but the male genitalia are distinct. See figures 67 and 68 in BOHART & MENKE (1963) for genitalic differences.

Isodontia (Isodontia) costipennis (Spinola)

Sphex costipennis Spinola, 1853. Mem. Accad. Sci. Torino [2] 13 : 54. Holotype ♀, Pará, Brazil (Università di Torino, Turin).

Both VAN DER VECHT (1961) and BOHART & MENKE (1963) considered *costipennis* a synonym of *I. fuscipennis* (Fabricius). However, examination of SPINOLA's type has proven that *costipennis* is a different species. It is related to *azteca* (Saussure) but has a narrower face and more strongly converging eyes. The body is black except for reddish middle and hind femora and tibiae. The erect clypeal hair is golden but the erect mesosomal hair is white. There is some appressed silver hair on the clypeus and also a small silver spot near the hind coxa. The first pair of wings are infumate along the costal margin. The type measures 23.5 mm. in length.

Palmodes dimidiatus (De Geer)

Sphex dimidiatus De Geer, 1773. Mem. Hist. Insect. 3 : 587. Holotype ♂, Pennsylvania (Naturhistoriska Riksmuseet, Stockholm).

Sphex violaceipennis Lepeletier, 1845. Hist. Natur. Insect., Hymen. 3 : 349. Holotype ♀, Philadelphia, Pennsylvania (type lost).

I was unable to find a specimen in SPINOLA's collection that could be considered the type of *violaceipennis* Lepeletier. KOHL (1890) and FERNALD (1906) were of the opinion that LEPELETIER's species was the same as *P. abdominalis* (Cresson) (= *dimidiatus* (De Geer)) and the original description does agree very well with DE GEER's species. Since the type of *violaceipennis* is lost it seems best to follow the interpretation of KOHL and FERNALD regarding the status of this species.

Chlorion viridicoeruleum Lepeletier and Serville

Chlorion viridicoeruleum Lepeletier and Serville, 1828. Encyclopedie Methodique 10 (livr. 100): 451. Holotype ♀, Cayenne, French Guiana (Africa on label) (Università di Torino, Turin).

I examined a female in Turin which is probably the type of *viridicoeruleum*. The label behind the specimens reads: "*Chlorion viridicoeruleum* Serv., Coll. Serv.,

Afrique". It is the same as the species referred to under this name by MENKE & WILLINK (1964). The fact that "Afrique" is mentioned on the label suggests an error in labelling or that the specimen may not be the real type, but in any case it is probably as close to type material as will ever be found.

Chlorion hemiprasinum (Sichel)

Sphex hemiprasina Sichel, 1863. Ann. Soc. Entomol. France [4] 3 : 23. Holotype ♀, Montevideo (Muséum d'Histoire Naturelle, Paris).

I have examined the type of *hemiprasinum* and can verify that MENKE & WILLINK (1964) were correct in their interpretation of this species.

Chlorion hemipyrrhum (Sichel)

Sphex hemipyrrha Sichel, 1863. Ann. Soc. Entomol. France [4] 3 : 23. Holotype ♀, Montevideo (Muséum d'Histoire Naturelle, Paris).

SICHEL described *hemipyrrhum* as variety E of *hemiprasinum.* One female in the Paris collection bears the label "*hemiprasinum,* var. E" and must be the type of *hemipyrrhum,* although it is not labelled as such. The type agrees with the interpretation of MENKE & WILLINK (1964). The gaster is entirely red and the wings are clear. The erect body hair is black.

Ammophila (Eremnophila) binodis (Fabricius)

Sphex binodis Fabricius, 1798. Suppl. Entomol. Syst., p. 243. Holotype ♀, Cayenne, French Guiana (Bosc Collection, Muséum d'Histoire Naturelle, Paris).

The type of *binodis* agrees with my interpretation of FABRICIUS' species (MENKE, 1964). This is the same specimen referred to by FERNALD (1931). The label on the type reads: "*S. binodis* Fab., Cajenne" and is in FABRICIUS' handwriting. Another label says "Cayenne, coll. Bosc 1828".

Ammophila (Eremnophila) auromaculata Perez

Ammophila auromaculata Perez, 1891. Mem. Soc. Zool. France 4 : 499. Holotype ♀, Gran Chaco (Muséum d'Histoire Naturelle, Paris).

The type of *auromaculata* agrees with my interpretation of this species (MENKE, 1964).

Ammophila (Eremnophila) eximia Lepeletier

Ammophila eximia Lepeletier, 1845. Hist. Natur. Insect., Hymen. 3 : 373. Holotype ♂, Brazil ("Am. Sept." on label) (Università di Torino, Turin).

Ammophila eugenia Smith, 1856. Cat. Hymen. Insect. Coll. Brit. Mus. 4 : 220. Holotype ♂, "R. Grand." (University Museum, Oxford).

MENKE (1964) correctly interpreted both of these names. The specimen examined in Turin is probably the type of *eximia* although the label behind the

wasp reads: "*Ammophila eximia* Kl., M. B., D. KLUG, Am. Sept." LEPELETIER gave "Bresil" as the type locality in the original description. The type is the all black form of the species and probably originated in northern South America since the mesopleural appressed hair is reduced to a small spot. The type of *eugenia* is a male of the bicolored form of *eximia.* Although SMITH described the acuminate clypeus of the male, in his description he said that it was a female.

Ammophila (Ammophila) gracilis Lepeletier

Ammophila gracilis Lepeletier, 1845. Hist. Natur. Insect., Hymen. 3 : 381. Holotype ♀, Mexico (Università di Torino, Turin).

Ammophila mutica Dahlbom, 1845. Hymen. Europaea 1 (fasc. 3): 431. Holotype, gynandromorph, Brazil (Lunds Universitets Zoologiska Institution, Lund). **New synonymy.**

Ammophila moneta Smith, 1856. Cat. Hymen. Insect. Coll. Brit. Mus. 4 : 219. Lectotype ♀, Brazil (British Museum, London), designated by MENKE, 1964. **New synonymy.**

Ammophila fragilis Smith, 1856. Cat. Hymen. Insect. Coll. Brit. Mus. 4 : 219. Lectotype ♀, Brazil (British Museum, London), designated by MENKE, 1964. **New synonymy.**

The types of all four names have been examined. *Ammophila gracilis* has priority over DAHLBOM's name because according to VERHOEFF (1948, p. 183) LEPELETIER's work appeared prior to the third fascicle of DAHLBOM's paper. The type locality of *gracilis* is certainly an error since the species is not known to occur outside of South America.

Podalonia violaceipennis (Lepeletier)

Ammophila violaceipennis Lepeletier, 1845. Hist. Natur. Insect., Hymen. 3 : 370. Lectotype ♀, Philadelphia, Pennsylvania (Mexico on label) (Università di Torino, Turin), present designation.

Ammophila cementaria Smith, 1856. Cat. Hymen. Insect. Coll. Brit. Mus. 4 : 223. Lectotype ♀, St. John's Bluff, E. Florida (British Museum, London), present designation.

I have examined the probable type of *violaceipennis* and can verify that MURRAY (1940) was correct in his interpretation of LEPELETIER's species. There are two different females pinned in front of the label *violaceipennis.* One is the same as *Podalonia montana* (Cameron) and is not a true type. The other fits the description of *violaceipennis* very well. To avoid confusion I have labelled the latter specimen as lectotype. Even so, there is the possibility that this specimen is not a true type because the label reads, "*Ammophila violaceipennis* Lep., G. *Psammophila* Dahlb., D. Deyrolles, Mexico". The type locality of *violaceipennis* is Philadelphia. The label may refer to the *montana* specimen which is a Mexican species. The type of *cementaria* Smith is identical with *violaceipennis.*

LITERATURE CITED

BOHART, R. M. & A. S. MENKE. 1963. A reclassification of the Sphecinae with a revision of the Nearctic species of the tribes Sceliphronini and Sphecini. Univ. Calif. Pub. Entomol. 30 : 91—182.

FERNALD, H. T. 1906. The digger wasps of North America and the West Indies belonging to the subfamily Chlorioninae. Proc. U. S. Nat. Mus. 31 : 291—423.

———, 1931. Notes on some American Sphecinae. Ann. Entomol. Soc. Amer. 24 : 439—450.

KOHL, F. F. 1890. Die Hymenopterengruppe der Sphecinen I. Ann. Naturhist. Hofmus. Wien 5 : 77—194, 317—561.

———, 1895. Zur Monographie der naturlichen Gattung *Sphex* Linne. Ann. Naturhist. Hofmus. Wien 10 : 42—74.

MENKE, A. S. 1963. Notes and synonymy of some Neotropical *Sphex* and *Isodontia* described by E. Taschenberg and S. Rohwer. Pan Pacific Entomol. 39 : 228—230.

———, 1964. A new subgenus of *Ammophila* from the Neotropical Region. Can. Entomol. 96 : 874—883.

——— & A. WILLINK. 1964. A survey of the Neotropical species of *Chlorion*. Ann. Entomol. Soc. Amer. 57 : 548—552.

MURRAY, W. D. 1940. *Podalonia* of North and Central America. Entomol. Amer. 20 : 1—82.

SCHULZ, W. A. 1912. Aelteste und alte Hymenopteren skandinavischer Autoren. Berlin. Entomol. Zeitschr. 57 : 52—102.

VECHT, J. VAN DER. 1961. Hymenoptera Sphecoidea Fabriciana. Zool. Verh. Leiden 48 : 1—85.

VERHOEFF, P. M. F. 1948. Systematische Verzeichnis der niederländischen *Oxybelus*-Arten. Tijdschr. Entomol. 89 : 158—208.

WILLINK, A. 1951. Las especies Argentinas y Chilenas de Chlorionini. Acta Zool. Lilloana 11 : 53—225.

Tijdschrift voor Entomologie

Het verschijnt in één deel van 350—450 bladzijden per jaar, bestaande uit enkele afleveringen.

Entomologische Berichten

Deze zijn bestemd voor de publicatie van kortere artikelen, faunistische notities etc., alsmede van de Verslagen der Vergaderingen en van mededelingen van het bestuur. Zij verschijnen twaalf maal per jaar in een aflevering van 16 of meer bladzijden, die samen een deel vormen.

Trichopterorum Catalogus

Deze Catalogus van F. C. J. Fischer wordt door de Vereeniging voor rekening van de auteur uitgegeven. Alle bekende recente en fossiele soorten van de gehele wereld met hun synoniemen worden er in behandeld. Delen I en II kosten f 39.— per stuk, delen III—V: f 45.—. Er zullen in totaal 15 delen verschijnen. Van alle delen zijn ook éénzijdig bedrukte exemplaren beschikbaar. De prijsverhoging hiervoor bedraagt f 2.50.

Entomologia Experimentalis et Applicata

Dit tijdschrift wordt uitgegeven door de Noord-Hollandse Uitgevers Maatschappij te Amsterdam in opdracht van de Vereeniging. Het publiceert artikelen over experimentele biologie en oekologie bij insecten en andere land-arthropoden. Het verschijnt vier maal per jaar en bevat 320 bladzijden. De prijs voor leden bedraagt f 25.—, voor niet-leden f 40.— per jaar.

Alle zakelijke correspondentie betreffende de Vereeniging te richten aan de Secretaris, W. Hellinga, Weesperzijde 23II, Amsterdam-O.

Alle correspondentie over de redactie van het Tijdschrift voor Entomologie en de Monographieën te richten aan de Redacteur, Dr. A. Diakonoff, Rijksmuseum van Natuurlijke Historie, Leiden.

Alle correspondentie over de redactie van de Entomologische Berichten te richten aan de Redacteur, B. J. Lempke, Oude IJselstraat 12III, Amsterdam-Z. 2.

Alle correspondentie over de redactie van Entomologia Experimentalis et Applicata te richten aan de Redacteur, Dr. P. A. van der Laan, Lab. voor Toegepaste Entomologie, Linnaeusstraat 2 B, Amsterdam.

Alle betalingen te richten aan de Penningmeester, Drs. H. Wiering, Doorntjes 29, Bergen (N.H.), postgiro 188130, ten name van de Nederlandsche Entomologische Vereeniging te Bergen (N.H.).

Alle correspondentie betreffende de Bibliotheek der Vereeniging te richten aan de Bibliotheek, Zeeburgerdijk 21, Amsterdam-O.

Notice to Subscribers

All correspondence referring to subscriptions and exchange of the periodicals of the Netherlands Entomological Society should be addressed to the Librarian, Zeeburgerdijk 21, Amsterdam-O, Netherlands.

NOTICE TO CONTRIBUTORS

Contributors will receive free of charge fifty reprints of their papers, joint authors have to divide this number between them at their discretion. Additional reprints may be ordered when returning proofs.

Manuscripts should be written in Dutch, English, French, German or Italian. If they contain descriptions of new genera, species, etc., they should be in one of the four last mentioned languages.

The author should communicate with the editor before submitting his manuscript. He will enclose with manuscript a Synopsis (Abstract), styled according to recommendations of the UNESCO (style rules will be provided by the editor) and, if needed, a Summary. Papers in Dutch should contain an Abstract and/or a Summary in one of the four other languages.

Manuscripts should be typewritten in double spacing on only one side of the paper, with a margin of at least three cm at the left side of each sheet. Paragraphs should be indented. Carbon copies cannot be accepted, as handling makes them illegible.

Captions for text figures and plates should be written on a separate sheet in double spacing, numbered consecutively in arabic numerals; the use of a, b, c, or any other subdivision of the figure numbering should be avoided.

Drawings for reproduction should be on good paper in Indian ink, preferably at least one and a half times as large as the ultimate size desired. Lettering should be uniform, and, after reduction, of the same size. Photographs should be furnished as shiny positive prints, unmounted. Plates should be arranged so as to fill a whole page (11.5 x 19 cm) of the *Tijdschrift,* or a portion thereof, captions included. Combinations of illustrations into groups are preferable to separate illustrations, since there is a minimum charge per block.

Names of genera and lower systematic categories, new terms and the like are to be underlined by the author in the manuscript by a single straight line. Any other directions as to size or style of the type are given by the editors, not by the author. Italic type or spacing to stress ordinary words or sentences is to be avoided. Dates should be spelled as follows: either "10.V.1948" or "10 May, 1948". Other use of latin numerals should be avoided, as well as abbreviations in the text, save those generally accepted. Numbers from one to ten occurring in the text should be written in full, one, two, three, etc. Titles must be kept short. Footnotes should be kept at a minimum.

Bibliography should not be given in footnotes but compiled in a list at end of the paper, styled as follows:

Mosley, M. E., 1932, "A revision of the European species of the genus *Leuctra* (Plecoptera)". — Ann. Mag. Nat. Hist. [10] 10 (3): 1—41, pl. 1—5, fig. 1—57. Number of issue should only be added (in parentheses) when it has individual pagination.

Text references to this list might be made thus:

"Mosley (1932) says...." or "(Mosley, 1932)".

The editors reserve the right to adjust style to certain standards of uniformity.

Manuscripts and all communications concerning editorial matters only should be sent to: Dr. A. Diakonoff, Rijksmuseum van Natuurlijke Historie, Leiden, The Netherlands.

DEEL 108 AFLEVERING 9 1965

TIJDSCHRIFT VOOR ENTOMOLOGIE

UITGEGEVEN DOOR

DE NEDERLANDSCHE ENTOMOLOGISCHE VEREENIGING

INHOUD:

Tijdschrift voor Entomologie, deel 108, afl. 9. Gepubliceerd 17-IX-1965

Nederlandsche Entomologische Vereeniging

De contributie voor het lidmaatschap bedraagt f 15.—, voor student-leden f 2.50, per jaar. — Begunstigers betalen jaarlijks tenminstet f 15.—.

De leden, behalve de student-leden, ontvangen gratis de *Entomologische Berichten*, waarvan de prijs voor student-leden f 1.50 per jaar, voor niet-leden f 20.— per jaar en f 2.— per nummer bedraagt.

De leden kunnen zich voor f 10.— per jaar abonneren op het *Tijdschrift voor Entomologie*; hiervan bedraagt de prijs voor niet-leden f 35.— per jaar.

De eerder verschenen publicaties der Vereeniging zijn voor de leden tegen verminderde prijzen verkrijgbaar. De Vereeniging geeft de volgende publicaties uit.

Monographieën van de Nederlandsche Entomologische Vereeniging

Deze worden met onregelmatige tussenpozen uitgegeven. Er zijn reeds verschenen:

— F. T. Valck Lucassen et al. — Monographie du genre Lomaptera Gory & Percheron (Coleoptera, Cetoniidae), prijs f 50.—.

1. A. J. Besseling. — De Nederlandse Watermijten (Hydrachnellae Latreille, 1802), prijs f 25.—.

EXTERNAL CHARACTERS OF SIBLING SPECIES TRECHUS OBTUSUS ER. AND T. QUADRISTRIATUS SCHRK. (COLEOPTERA)*

BY

P. J. DEN BOER

Biologisch Station, Wijster

ABSTRACT

A survey is given of the confusion in the literature about the taxonomic status of *Trechus obtusus* Er. By a quantitative analysis of the external characters mentioned in the literature and by measuring random samples of specimens from The Netherlands, Western Germany, Scandinavia, Czechoslovakia, England and Iceland, it is possible to judge the diagnostic significance of these characters. The only external characters by which *T. obtusus* can be separated from *T. quadristriatus* Schrk. appear to be the width of the temple, and the distance between the supra-orbital setigerous pores and the inner margin of the eye. It is evident that *T. obtusus* and *T. quadristriatus* should be considered distinct species, the former being dimorfic and the latter, macropterous.

INTRODUCTION

For a long time there has been much confusion in the literature about the taxonomic status of *Trechus obtusus* Er. Many authors from the 19th century considered *T. obtusus* a distinct species (e.g., ERICHSON, 1837; THOMSON, 1859; SCHAUM, 1860; PANDELLÉ, 1867; PUTZEYS, 1870; SEIDLITZ, 1891; cited by JEANNEL, 1927). whereas others believed it to be merely a brachypterous form of *T. quadristriatus* Schrk. (e.g., REDTENBACHER, 1858; GANGLBAUER, 1892; EVERTS, 1898). During the first quarter of the 20th century many authors again considered *T. obtusus* to be a separate species (e.g., REITTER, 1903, 1908; KUHNT, 1913; MUNSTER, 1926; DAHL, 1928), but others (e.g., APFELBECK, 1904; EVERTS, 1922) still regarded *T. obtusus* as a form of *T. quadristriatus*.

After the discovery of the valuable characters of the male genitalia (JEANNEL, 1927) most authors agreed that *T. obtusus* should be considered a distinct species, e.g., JEANNEL (1927, 1941); LINDROTH (1943, 1945); CSIKI (1946), with the remarkable exception of HORION (1941): "Nach meiner Meinung besteht die alte Ansicht von GANGLBAUER auch heute noch (trotz der JEANNEL'schen Monographie) zu recht, dass *obtusus* n u r e i n e F o r m von *quadristriatus* ist; ...... H. WAGNER ist derselben Ansicht".

---

*) Mededeling van het Biologisch Station te Wijster, No. 113 (Communication Nr. 113 of the Biological Station, Wijster, Holland).

In my opinion *T. obtusus* is a distinct species, the males of which can be separated from those of *T. quadristriatus* with the characters of the genitalia. I had the opportunity to study the genitalia of a great number of male specimens especially from the Netherlands, and also some from Western Germany and Iceland (fig. 1, 5).

Although I am sure that the structure of the male genitalia has solved the taxonomic status of *T. obtusus,* there is still much confusion about the external characters which enable us to separate *T. obtusus* from *T. quadristriatus.* This is illustrated by the following survey of the opinions of a number of authors. My view, to be presented here, is mainly based on the study of specimens from the Netherlands, Western Germany, Scandinavia, Iceland, Czechoslovakia and England.

TABLE 1. EXTERNAL CHARACTERS OF TRECHUS OBTUSUS ER. AND QUADRISTRIATUS SCHRK.

(1) *a. T. obtusus* is brachypterous and *quadristriatus* macropterous: REDTENBACHER, 1858; GANGLBAUER, 1892; EVERTS, 1898, 1922; DAHL, 1928; HORION, 1941; LINDROTH, 1943, 1945 (especially in West and North Europe); CSIKI, 1946.

— *b. T. obtusus* is dimorfic and *quadristriatus* macropterous (except specimens from Elbe, JEANNEL, 1927): JEANNEL, 1927, 1941; BRAKMAN, 1961; DEN BOER (p. 223).

(2) *a. T. obtusus* is smaller than *quadristriatus* : REITTER, 1908; KUHNT, 1913; the same, but only in the brachypterous form of *obtusus* and especially in the mountain form *renati* Jeann.: JEANNEL, 1941.

— *b. T. obtusus* is darker than *quadristriatus* : REITTER, 1908; KUHNT, 1913; DAHL, 1928; JEANNEL, 1927; CSIKI, 1946.

— *c.* No diagnostic differences in body length and in colour : GANGLBAUER, 1892; EVERTS, 1922; DEN BOER (p. 225 and Table 2; var. *renati* Jeann. is unknown to me).

(3) *a.* Hind angles of the pronotum are more rounded in *T. obtusus* than in *quadristriatus* : REDTENBACHER, 1858; GANGLBAUER, 1892; EVERTS, 1898; REITTER, 1908; DAHL, 1928; JEANNEL, 1927; CSIKI, 1946.
quadristriatus : REDTENBACHER, 1858; GANGLBAUER, 1892; EVERTS, 1898; REITTER, 1908; DAHL, 1928.

— *c.* Hind angles of the pronotum with a minute tooth in *T. quadristriatus* : GANGLBAUER, 1892.

— *d.* No diagnostic characters in the hind angles of the pronotum : GANGLBAUER, 1892; EVERTS, 1922; BRAKMAN, 1961; DEN BOER (they are highly variable).

(4) *a.* Elytra are more faintly striated in *T. obtusus* than in *quadristriatus* : GANGLBAUER, 1892; CSIKI, 1946.

— *b.* No diagnostic characters in the striae of the elytra : EVERTS, 1922; DEN BOER (highly variable).

(5) *a.* Elytra are shorter in *T. obtusus* than in *quadristriatus* : REDTENBACHER, 1858; the same especially in the brachypterous form of *obtusus* : JEANNEL, 1927, 1941; BRAKMAN, 1961.

— *b.* Elytra are broader and more rounded in *T. obtusus* than in *quadristriatus* : EVERTS, 1898; CSIKI, 1946; the same especially in the brachypterous form of *obtusus* : JEANNEL, 1927, 1941; BRAKMAN, 1961.

— *c.* No diagnostic characters in the dimensions of the elytra, neither for the separation of *T. obtusus* from *quadristriatus,* nor of brachypterous from macropterous specimens of *obtusus* : DEN BOER (Table 4; fig. 2, 6 and graph 1); unfortunately it was not possible to study material from France. As far as the material studied is concerned, in *T. obtusus* the elytra are somewhat more rounded laterally than in *quadristriatus* (fig. 2, 6), but this difference could hardly be used for the separation of the two species; moreover the dimensions of the elytra are highly variable and the values largely overlap : DEN BOER (p. 225).

(6) *a.* Eyes are smaller in *T. obtusus* than in *quadristriatus* : GANGLBAUER, 1892; REITTER, 1903; JEANNEL, 1927.

— *b.* Eyes larger in *T. obtusus* than in *quadristriatus* : CSIKI, 1946.

— *c.* No diagnostic difference in the diameter of the eye, although in the material studied the eyes were on the whole a little smaller in *T. obtusus* than in *quadristriatus* : DEN BOER (p. 230 and Table 7).

(7) Temple is shorter in *T. quadristriatus* than in *obtusus* : REITTER, 1903; DEN BOER (p. 230, Table 7, and fig. 3—4, 7—8).

(8) *a.* Posterior supra-orbital setigerous pore b e h i n d the level of the hind margin of the eye in *T. obtusus* and i n this level in *quadristriatus* : GANGLBAUER, 1892; MUNSTER, 1926.

— *b.* Posterior supra-orbital setigerous pore i n the level of the hind margin of the eye in *T. obtusus* and b e f o r e it in *quadristriatus* : REITTER, 1903.

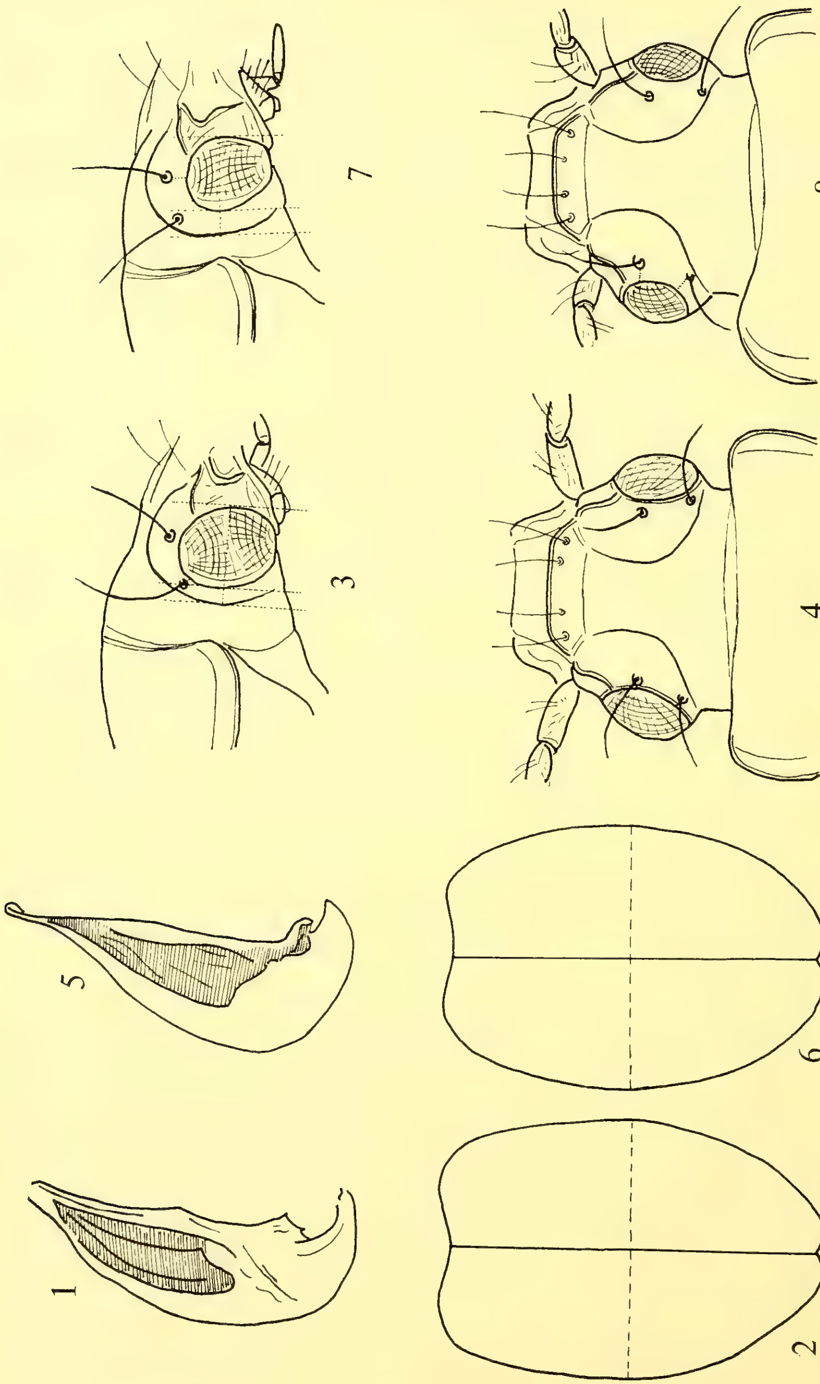
— *c.* No diagnostic character in the position of the posterior supra-orbital pore with respect to the hind margin of the eye, although in general this pore is situated more backward with respect to the hind margin of the eye in *T. obtusus* than in *quadristriatus* (fig. 3—4, 7—8); however, the situation is highly variable and difficult to express quantitatively : BRAKMAN, 1961; DEN BOER (p. 235).

(9) Both the anterior and the posterior supra-orbital setigerous pores closer to the inner margin of the eye in *T. quadristriatus* than in *obtusus :* DEN BOER (p. 232, Table 9 and fig. 3—4, 7—8).

MATERIAL AND METHODS

To study more closely the external characters of *T. obtusus* and *T. quadristriatus* the following material was examined: 458 specimens from different parts of the Netherlands (31 from the collection P. VAN DER WIEL, 29 from the collection K. VEGTER (Emmen), 257 from Rijksmuseum van Natuurlijke Historie, Leiden (119 of which from the collection EVERTS), 88 from the Meijendel collection, Zoölogisch Laboratorium, Leiden *, and 53 from the collection of Biologisch Station, Wijster); 104 specimens from different parts of Western Germany (Zoologisches Forschungsinstitut und Museum Alexander Koenig, Bonn, among which

*) A random sample of 88 specimens of the 1953 catches from Meijendel, Netherlands (DEN BOER, 1958a and b) appear to contain *T. obtusus* only. This means that the results mentioned in these papers on *quadristriatus* obviously concern *obtusus*.


7
8
3
4
5
6
1
2

specimens of HORION); 333 specimens from Drahanoviče (Olomouc, Czechoslovakia, B. NOVÁK); about 250 specimens from different parts of Sweden, 120 specimens from Iceland, five specimens from Finland, four specimens from the Caucasus, and one specimen from Esthonia, Norway, Denmark and Czechoslovakia each (these 383 specimens from Naturhistoriska Museet, Göteborg, for the greater part from the collection LINDROTH); 70 specimens from Wellesbourne (National Vegetable Research Station, Warwickshire, England, S. FINCH) and six specimens from Austria (Naturhistorisches Museum, Wien).

To test as objectively as possible the diagnostic value of the external characters recorded in the literature and given here in Table 1, the genitalia of a large number of male beetles collected in the Netherlands (especially from the collections K. VEGTER, P. VAN DER WIEL and Biologisch Station, Wijster) were dissected. Clear differences in the genitalia enabled me to separate these males easily and completely into two groups: *quadristriatus* (fig. 1) and *obtusus* (fig. 5). In the first place it appeared that these *quadristriatus* males were all macropterous while some of the *obtusus* males were macropterous but most specimens were brachypterous (also: Table 1, no. 1b). Next, the external characters of these two groups were studied and compared (Table 1). The only external characters which allowed separation into the same two groups as the male genitalia were: the width of the temple (Table 1, no. 7) and the distance between the supra-orbital setigerous pores and the inner margin of the eye (Table 1, no. 9). The division is especially distinct if in each specimen these dimensions are related to the diameter of the eye (p. 230 and 232).

With the help of these external characters most specimens (including females) could be placed into one of the groups mentioned above; of males that could not easily be identified in this way (especially some macropterous specimens) the genitalia were examined. In random samples from different regions the width of the temple, the diameter of the eye and the distance between the supra-orbital setigerous pores and the inner margin of the eye were measured with an eyepiece micrometer (enlargement 25 $\times$ 4, i.e., one eyepiece micrometer unit $=$ 24,3 μ) in the manner as given in fig. 3—4, 7—8; the results are given in Tables 7 and 9. In other random samples from the same regions the length of the body, the length of the elytra and the greatest width of both elytra combined (enlargement 25 $\times$ 1,6, i.e., one eyepiece micrometer unit $=$ 63,1 μ) were measured (results in Tables 2 and 4).

RESULTS

L e n g t h o f t h e b o d y. To test the diagnostic value of the length of the body (Table 1, no. 2) the frequency distributions over ten classes (class interval $=$ 0,12 mm) of a number of random samples containing 30 specimens each were compared

Fig. 1—4. *Trechus quadristriatus* Schrk. 1—2, specimen from Emmen, Province of Drente (coll. K. VEGTER); 1. aedeagus, lateral aspect; 2. elytra; 3—4, the same, specimen from Schouwen, Province of Zeeland (coll. V. D. WIEL); 3, temple region of head, lateral aspect; 4, head, dorsal aspect. Fig. 5—8. *T. obtusus* Er. 5—6, macropterous specimen from Emmen (coll. K. VEGTER); 5, aedeagus, lateral aspect; 6, elytra; 7—8, the same, specimen from Lheebroek, Province of Drente (coll. Biol. Stat., Wijster); 7, temple region of head; 8, head, dorsal aspect

Table 2. Body length in different samples of Trechus obtusus and T. quadristriatus

Specimens from	cf. Table 3	sample of species	length of the body (in mm) 3.05-3.17	3.18-3.30	3.31-3.43	3.44-3.56	3.57-3.69	3.70-3.82	3.83-3.95	3.96-4.08	4.09-4.21	4.22-4.34	total number
Netherlands	A	T. obtusus macropterous			1		4	4	6	3	8	4	30
	B	T. obtusus brachypterous	1	1		2	5	5	6	8	2		30
	A+B	T. obtusus macr. + brach.	1	1	1	2	9	9	12	11	10	4	60
	C	T. quadristriatus	1		1	3	3	9	5	4	3	1	30
Western Germany	E	T. quadristriatus				1	4	8	9	6	2		30
	F	T. obtusus macr. + brach.				5	2	13	5	4		1	30
Iceland	D	T. obtusus brachypterous				3	3	10	4	7	1	2	30
Czechoslovakia	G	T. quadristriatus				2	4	7	8	7	2		30

(Table 2). It is evident from Table 2 that the frequency distributions of most samples largely or wholly overlap, to such an extent that the body length cannot have any diagnostic value, neither for separation of *T. obtusus* and *quadristriatus,* nor for ready separation of the brachypterous and macropterous specimens of *T. obtusus,* nor of individuals of the same species from different regions. When tested with the two-sample test devised by WILCOXON (VAN DER VAART, 1950; WABEKE & VAN EEDEN, 1955; DE JONGE, 1963) the differences between various combinations of two samples are significant in only two out of ten cases tested (Table 3): macropterous *T. obtusus* specimens from the Netherlands (A) are significantly longer than brachypterous specimens (B) and even significantly longer than *T. quadristriatus* specimens from the Netherlands (C) (also: Table 1, no. 2a). Although in the greater body length the macropterous specimens of *T. obtusus* agree with JEANNEL's form *obtusioides* (JEANNEL, 1927, 1941), in my opinion there is no reason to consider these specimens as belonging to a separate form, since body length measured in the two Dutch samples (A and B) overlap to a great extent (about 85%); unfortunately among the *obtusus* specimens studied from other regions (183 in total) only a few macropterous specimens were found (eight from Western Germany and one from the Caucasus).

Table 3. Length of the body

p value of the difference between two samples

samples cf. Table 2		p value of the difference between a and b
a	b	
A	B	0.0324
B	C	0.8026
A	C	0.0348
B	D	0.5824
B	F	0.2584
D	F	0.2006
E	F	0.0548
C	E	0.3734
C	G	0.5486
E	G	0.7948

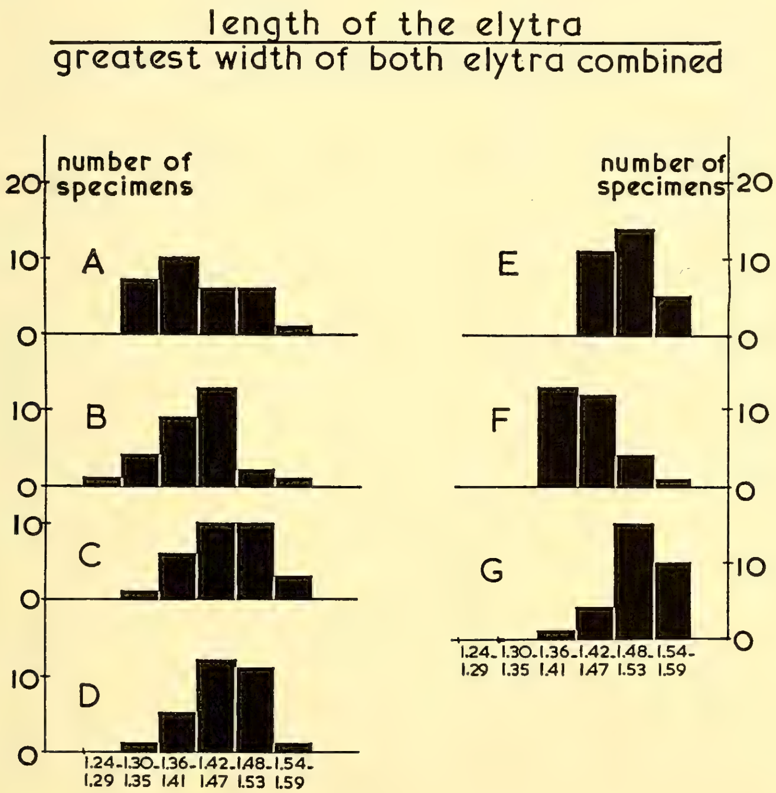
D i m e n s i o n s o f t h e e l y t r a. From Table 4 it will be evident that no diagnostic characters can be found in the length (Table 1, no. 5a) or the width (Table 1, no. 5b) of the elytra. Nevertheless, the elytra of *T. obtusus* specimens generally make an impression of being somewhat shorter and broader than those of *T. quadristriatus* specimens. This is however, a form of optical illusion, caused by the laterally more rounded elytra in *obtusus* as compared with the elytra in

Table 4. Dimensions of the elytra in different samples of Trechus obtusus and T. quadristriatus

Specimens from	sample of species		length of the elytra (in mm)							greatest width of both elytra together (in mm)					total number
			1.79–1.91	1.92–2.04	2.05–2.17	2.18–2.30	2.31–2.43	2.44–2.56	2.57–2.69	1.27–1.39	1.40–1.52	1.53–1.65	1.66–1.78	1.79–1.91	
Netherlands	A	T. obtusus macropterous			3	3	12	8	4		2	10	13	5	30
	B	T. obtusus brachypterous	1		3	6	9	11		1	3	10	14	2	30
	A+B	T. obtusus macr. + brach.	1		6	9	21	19	4	1	5	20	27	7	60
	C	T. quadristriatus		1	3	1	18	6	1	2	4	14	10		30
Western Germany	E	T. quadristriatus				3	16	10	1		5	17	8		30
	F	T. obtusus macr. + brach.			3	10	13	3	1		5	16	9		30
Iceland	D	T. obtusus brachypterous			4	8	14	2	2		7	18	5		30
Czechoslovakia	G	T. quadristriatus				3	12	11	4		5	19	6		30

quadristriatus (Table 1, no. 5c). This optical illusion is nicely illustrated by two specimens from Emmen with exactly the same length and width of the elytra: one *quadristriatus* specimen (fig. 2) and one macropterous *obtusus* specimen (fig. 6).

Besides the small but unreliable (difficult to express quantitatively) difference in the lateral curve of the elytra, the form of the elytra, expressed as the quotient $\frac{\text{length of the elytra}}{\text{greatest width of both elytra combined}}$ largely overlaps in the two species (graph 1) and consequently has no diagnostic value (Table 1, no. 5c). Nevertheless, the differences between various combinations of two samples are often significant (Table 5; WILCOXON's two sample test). Generally the value of the



Graph 1. Shape of the elytra (length/greatest width) in 30 specimens of *Trechus*. *A. obtusus* (macropterous), Netherlands. B. *obtusus* (brachypterous), Netherlands. C. *quadristriatus,* Netherlands. D. *obtusus* (brachypterous), Iceland. E. *quadristriatus,* Western Germany. F. *obtusus* (brachypterous + macropterous), Western Germany. G. *quadristriatus,* Czechoslovakia (cf. Table 5)

quotient is significantly higher (form of the elytra more elongate) in the samples of *quadristriatus* than in those of *obtusus.* There are, however, important statistical differences in the form of the elytra between samples of the same species from different regions (geographic variation). For instance, the quotient mentioned

Table 5. $\frac{\text{length of the elytra}}{\text{greatest width of both elytra together}}$

p value of the difference between two samples

samples		p value of the difference between a and b
a	b	
A	B	0.842
B	C	0.00252
A	C	0.00596
B	D	0.00222
C	D	0.8258
C	E	0.022
E	G	0.091
C	G	0.000176
B	F	0.418
D	F	0.1416
D	E	0.00652
E	F	<0.000066 (x = 4.61)

Table 6. Diameter of the eye

p value of the difference between two samples

samples (see: Table 7)		p value of the difference between a and b	samples (see: Table 7)		p value of the difference between a and b
a	b		a	b	
A	B	0.1286	E	G	0.3844
B	C	0.000108	C	H	0.0548
A	C	0.5028	E	H	0.0156
B	D	<0.000066 (x = 4.22)	G	H	0.0628
B	F	<0.000066 (x = 6.60)	H	J	0.6242
D	F	0.00544	E	J	0.00988
E	F	<0.000066 (x = 6.20)	C	J	0.3788
C	E	<0.000066 (x = 5.50)	G	J	0.0414
C	G	<0.000066 (x = 4.56)			

Table 7. Width of the temple and diameter of the eye in different samples of Trechus obtusus and T. quadristriatus ')

cf. Table 6			width of the temple (in μ)							diameter of the eye (in μ)					
Specimens from	sample of species		14–26	27–39	40–52	53–65	66–78	79–91	92–104	191–215	216–240	241–265	266–290	291–315	total number
Netherlands	A	T. obtusus macropterous				3	11	10	7	1	7	17	6		31
	B	T. obtusus brachypterous			1	10	38	11	9	2	13	30	24		69
	A+B	T. obtusus macr. + brach.			1	13	49	21	16	3	20	47	30		100
	C	T. quadristriatus		13	77	10					4	37	50	9	100
Western Germany	E	T. quadristriatus		1	30	24	5			2	15	34	9		60
	F	T. obtusus macr. + brach.				3	14	19	8	18	18	8			44
Iceland	D	T. obtusus brachypterous					15	9	6	3	17	8	2		30
Czechoslovakia	G	T. quadristriatus	2	27	29	10	2				21	32	15	2	70
Scandinavia	H	T. quadristriatus		3	21	6					2	17	9	2	30
England	J	T. quadristriatus		9	12	6	3			1	5	11	10	3	30

') the measures are taken from the left side of the head as far as possible.

above is significantly higher in *obtusus* specimens from Iceland (D) than in those from the Netherlands (A), whereas *obtusus* specimens from Western Germany (F) are intermediate. In fact, the form of the elytra in *obtusus* specimens from Iceland (D) is the same as that in *quadristriatus* specimens from the Netherlands (C). The elytra of *quadristriatus* specimens from Czechoslovakia (G) are the most elongate among the samples studied.

Diameter of the eye. Although in the *T. obtusus* samples the diameter of the eye is in general a little smaller than in the *quadristriatus* samples (Table 7), this difference has no diagnostic value (Table 1, no. 6), since there is an important overlap. About half of the differences between various combinations of two samples are significant (Table 6), but they do not show any clear tendency: the diameter of the eyes in brachypterous (B) and in macropterous (A) *obtusus* specimens from the Netherlands do not differ significantly, whereas the diameter of the eye in Dutch *quadristriatus* specimens (C) is significantly greater than that in brachypterous *obtusus* specimens (B) but it does not differ from that in macropterous *obtusus* specimens (A); the diameters of the eyes differ significantly in *obtusus* samples from different regions (geographic variation; Table 6 : B and D, B and F, D and F), but not in all samples of *T. quadristriatus*.

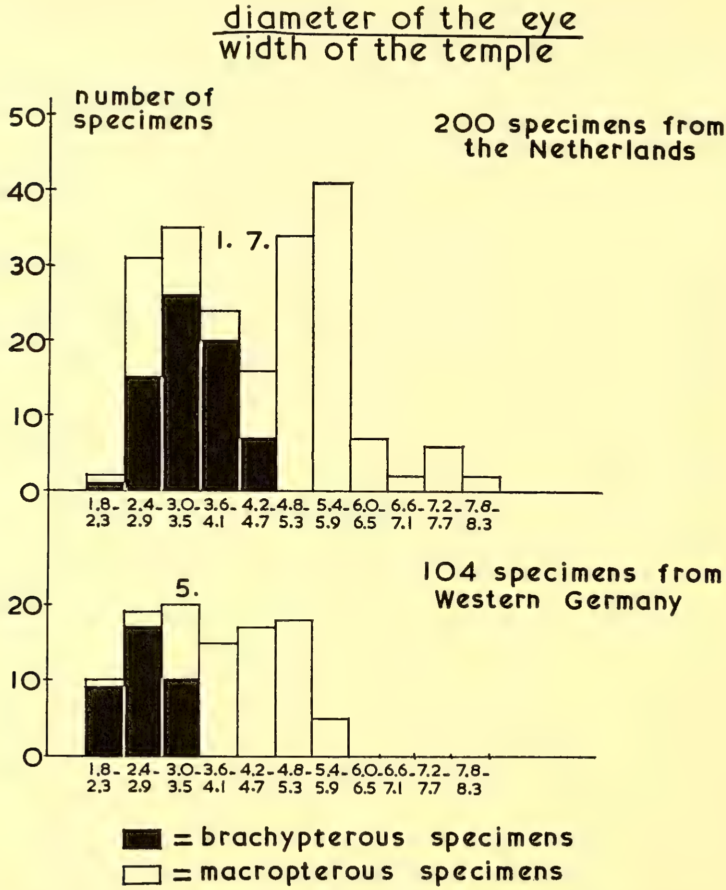
Width of the temple. From Table 7 it will be seen that in general the temple is diagnostically wider in *T. quadristriatus* specimens than in *obtusus* specimens (Table 1, no. 7), which is especially clear if specimens of the two species from the same region are compared. Since the width of the temple is highly influenced by the diameter of the eye (the position of the frontal groove is apparently more fixed than the diameter of the eye; see also fig. 3—4 and 7—8), the value of the quotient $\frac{\text{diameter of the eye}}{\text{width of the temple}}$ separates *obtusus* and *quadristriatus* specimens more sharply.

To show the diagnostic value of this character, the frequency distributions over eleven classes of the quotient, are given for all measured specimens combined from the Netherlands and Western Germany (graph 2). The histogram of the Dutch specimens is evidently bimodal: apparently one population consists of macropterous specimens only, the other mainly of brachypterous individuals. Thus, the Dutch material must contain two separate forms, one macropterous (*T. quadristriatus*) and one dimorfic (*T. obtusus*). The histogram of the specimens from Western Germany is less clear in this respect, although the distribution of macropterous and brachypterous specimens shows the same division into two separate groups. In the *Trechus* material from Western Germany this character apparently discriminates less distinctly between *T. quadristriatus* and *obtusus* than in the material from the Netherlands.

The data for the specimens from other regions are given in Table 8. From this table (and from graph 2) it is obvious that this character is more variable in *T. quadristriatus* than in *obtusus*; this is especially clear for the specimens from Czechoslovakia (Drahanoviče) and from England (Wellesbourne).

Table 8. Width of the temple in relation to the diameter of the eye

Specimens from	sample of species	diameter of the eye / width of the temple														total number
		1.8–2.3	2.4–2.9	3.0–3.5	3.6–4.1	4.2–4.7	4.8–5.3	5.4–5.9	6.0–6.5	6.6–7.1	7.2–7.7	7.8–8.3	8.4–8.9	9.0–9.5	9.6–10.1	
Iceland	D T. obtusus	1	15	14												30
Scandinavia	H T. quadristriatus					5	16	5	2	2						30
Scandinavia	T. obtusus		4	4												8
Czechoslovakia	G T. quadristriatus			1	8	14	13	4	7.	12	6		1	3	1	70
Central Europe (Austria)	T. obtusus	1	4	2												7
Caucasus	T. obtusus		3	1												4
England	J T. quadristriatus		1	2	3	6	4	3	2	1	7		1			30



Graph 2. Width of the temple in relation to the diameter of the eye in all measured *Trechus* specimens from the Netherlands and Western Germany combined (cf. Table 8). Figures above columns indicate number of *T. quadristriatus* specimens falling in the relevant class (only given for classes where both species are represented)

Distance between the inner margin of the eye and the supra-orbital pores. Table 9 shows that in *T. quadristriatus* specimens the distance between the inner margin of the eye and the supra-orbital pores is diagnostically smaller than in *obtusus* specimens (Table 1, no. 9), which is clearer for the posterior supra-orbital pore than for the anterior. Since the distance between the inner margin of the eye and these pores is highly influenced by the diameter of the eye (the position of the supra-orbital pores is apparently more fixed than the diameter of the eye; see also fig. 3—4, 7—8), specimens of *obtusus* and of *quadristriatus* can be separated even more sharply by the value of the quotient

$$\frac{\text{diameter of the eye}}{\text{distance: anterior supra-orbital pore — eye}} \left(\frac{\text{d. eye}}{\text{a.p. — eye}}\right),$$ or by the value

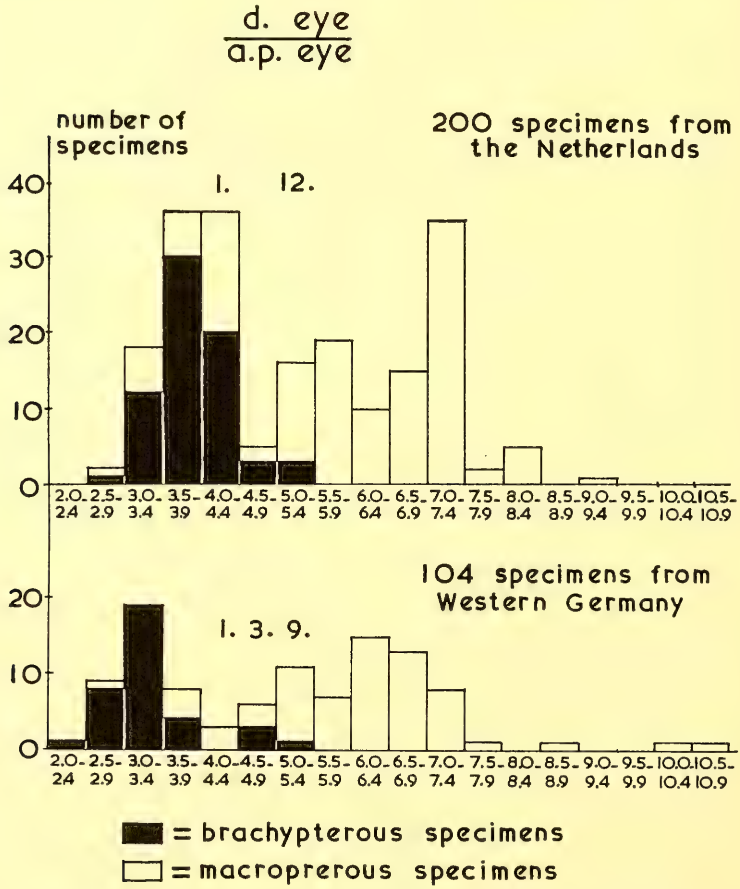
$$\frac{\text{diameter of the eye}}{\text{distance: posterior supra-orbital pore — eye}} \left(\frac{\text{d. eye}}{\text{p.p. — eye}}\right).$$

Table 9. Position of the supra-orbital pores in different samples of Trechus obtusus and T. quadristriatus[1])

Specimens from	sample of species		distance (in μ) between the inner margin of the eye and													total number
			the anterior supra-orbital pore						the posterior supra-orbital pore							
			14–26	27–39	40–52	53–65	66–78	79–91	14–26	27–39	40–52	53–65	66–78	79–91	92–104	
Netherlands	A	T. obtusus macropterous			3	19	8	1			1	17	13			31
	B	T. obtusus brachypterous			5	32	32				12	36	17	4		69
	A+B	T. obtusus macr.+brach.			8	51	40	1			13	53	30	4		100
	C	T. quadristriatus	3	59	37	1			12	78	9	1				100
Western Germany	E	T. quadristriatus	2	39	19				10	43	7					60
	F	T. obtusus macr.+brach.			6	18	16	4			6	13	22	3		44
Iceland	D	T. obtusus brachypterous			4	11	15					6	17	6	1	30
Czechoslovakia	G	T. quadristriatus	7	47	15	1			30	31	7	2				70
Scandinavia	H	T. quadristriatus		11	17	2			1	19	10					30
England	J	T. quadristriatus		11	18	1			4	20	6					30

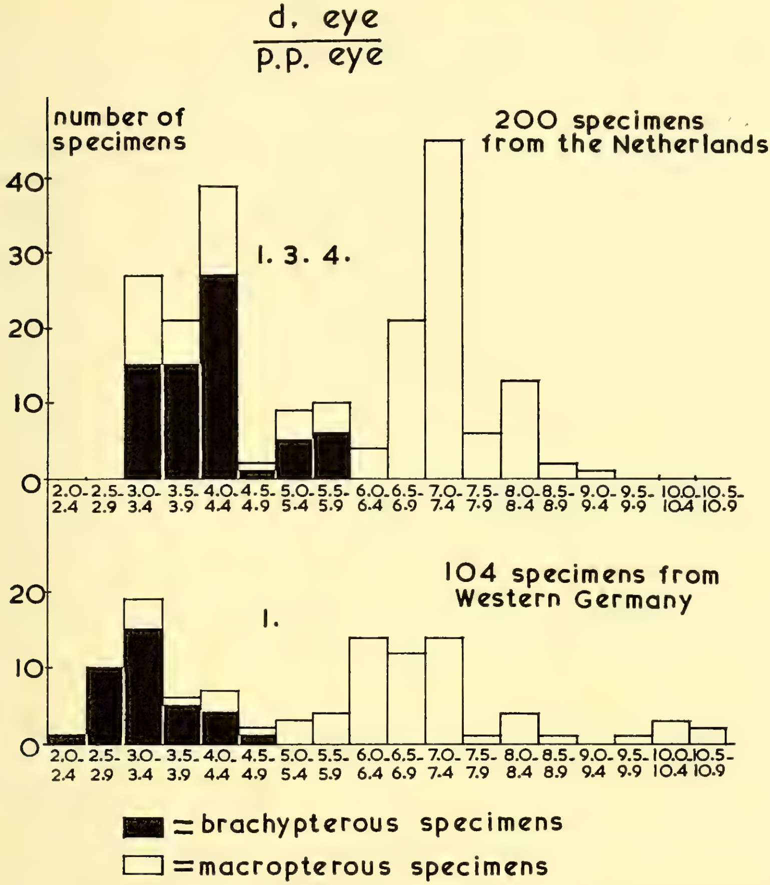
[1]) The measures are taken from the left side of the head as far as possible.

To show the diagnostic value of these characters the frequency distributions of these two quotients are given for all the measured *Trechus* specimens combined from the Netherlands and Western Germany (graph 3—4). Both histograms of graph 3 and those of graph 4 are bimodal, so that it is evident that the material from the Netherlands as well as that from Western Germany contains two separate forms: one macropterous (*T. quadristriatus*) and one dimorfic (*T. obtusus*). A comparison of the graphs 3 and 4 shows that $\frac{\text{d. eye}}{\text{p.p. — eye}}$ (graph 4) dis-



Graph 3. Position of anterior supra-orbital pore in relation to diameter of eye in all measured *Trechus* specimens from the Netherlands and Western Germany combined (cf. Table 10). Figures above columns indicate number of *T. quadristriatus* specimens falling in the relevant class (only given for classes where both species are represented)

criminates more sharply between *T. quadristriatus* and *obtusus* than does $\frac{\text{d. eye}}{\text{a.p. — eye}}$ (graph 3). The same conclusion can be drawn from Table 10 in which the data for specimens from other regions are given. From this table it becomes



Graph 4. Position of posterior supra-orbital pore in relation to diameter of eye in all measured *Trechus* specimens from the Netherlands and Western Germany combined (cf. Table 10). Figures above columns indicate number of *T. quadristriatus* specimens falling in the relevant class (only given for classes where both species are represented)

clear that these characters are more variable in *T. quadristriatus* than in *obtusus,* which is especially evident for the specimens from Czechoslovakia (Drahanoviče).

Since in both specimens not only the diameter of the eye but also the form of the eye is highly variable (e.g., fig. 3, 7), the position of the posterior supra-orbital pore in comparison with the hind margin of the eye (in or behind this level) is also variable and has no or only little diagnostic value (Table 1, no. 8).

Conclusions

We may conclude that *Trechus obtusus* and *T. quadristriatus* should be considered distinct species which can be distinguished not only by the shape of the male genitalia but also by the following characters:

(a) In *T. obtusus* the temple is diagnostically wider than in *quadristriatus*; the

Table 10. Position of the supra-orbital pores in relation to the diameter of the eye

Specimens from	sample of species	diameter of the eye / distance:anterior supra-orbital pore-eye																					total number
		2.0-2.4	2.5-2.9	3.0-3.4	3.5-3.9	4.0-4.4	4.5-4.9	5.0-5.4	5.5-5.9	6.0-6.4	6.5-6.9	7.0-7.4	7.5-7.9	8.0-8.4	8.5-8.9	9.0-9.4	9.5-9.9	10.0-10.4	10.5-10.9	11.0-11.4	11.5-11.9	12.0-12.4	
Iceland	D T. obtusus		1	13	11	2	2	1															30
Scandinavia	H T. quadristriatus					1	2	8	6	3	5	5											30
Scandinavia	T. obtusus	1	1	5		1																	8
Czechoslcvakia	G T. quadristriatus					1	5	9	2	13	13	14	4	1	1	1		2	3			1	70
Central Europe (Austria)	T. obtusus		1	3	2		1																7
Caucasus	T. obtusus			1		2	1																4
England	J T. quadristriatus						5	9	5	1	2	4	2	2									30
specimens from	sample of species	diameter of the eye / distance:posterior supra-orbital pore-eye																					total number
Iceland	D T. obtusus	1	8	14	5	2																	30
Scandinavia	H T. quadristriatus							4	4	4	10	6	1						1				30
Scandinavia	T. obtusus		3	3	1	1																	8
Szechoslovakia	G T. quadristriatus					2	2	3	2	8	9	10		3	1	4	6	6	5	5	3	1	70
Central Europe (Austria)	T. obtusus	2	1	2	1	1																	7
Caucasus	T. obtusus		1	2	1																		4
England	J T. quadristriatus							3	3	4	4	6	5		1		2		1			1	30

separation is especially distinct (p. 230) in the form of the quotient $\dfrac{\text{width of the temple}}{\text{diameter of the eye}}$.

(b) Both the anterior and the posterior supra-orbital setigerous pores are situated diagnostically closer to the inner margin of the eye in *T. quadristriatus* than in *obtusus;* the separation is especially distinct (p. 232) in the form of the quotients $\dfrac{\text{d. eye}}{\text{a.p. — eye}}$ and $\dfrac{\text{d. eye}}{\text{p.p. — eye}}$. The position of the posterior supra-orbital pore is more important for diagnosis than the position of the anterior pore.

(c) As far as the material studied is concerned (p. 221), *T. quadristriatus* is a constantly macropterous species, and *obtusus,* a dimorfic one in which the brachypterous form is the more common. Thus, brachypterous specimens always belong to *T. obtusus* (except in the Isle of Elbe where the brachypterous form would belong to *T. quadristriatus* : Jeannel, 1927).

(d) The remaining external characters from those mentioned in Table 1 have no diagnostic value for the regions where the specimens under consideration came from. In doubtful cases (which were very few among the 1354 *Trechus* studied, p. 223) the form of the elytra, especially the lateral curve (p. 225) may give some indication as to specific identity.

(e) In both species many dimensions show a distinct geographic variation (e.g., Tables 5 and 6 and 7, 8 and 10).

No other diagnostic differences than the development of the wings could be found between macropterous and brachypterous *T. obtusus* specimens from the Netherlands (52 macropterous and 230 brachypterous specimens were studied). Hence, in my opinion, there is no more reason for naming the macropterous form in *T. obtusus* (f. *obtusioides* Jeannel) than in other dimorfic species of Carabid beetles (p. 225). This doet not exclude, of course, that in Southern France, Spain and North Africa, the range of *abtusioides* according to Jeannel (1927), the full-winged form could be much more distinct morphologically than in the Netherlands. I had no opportunity to study specimens from Southern Europe and North Africa, but the remark by Jeannel (1927): "Pas plus *obtusioides* que *renati* ne présentent d'ailleurs une constance absolue dans leurs caractères extérieurs; ce sont des variétés plus fréquentes dans certaines conditions de climat et d'altitude, mais non des sous-espèces nettement tranchées", suggests that for these geographical areas too, the situation is obscure.

Distribution

According to Jeannel (1927, 1941) the macropterous form *obtusioides* of *Trechus obtusus* is restricted to Southern France (1927: Bordeaux, Gironde; Castres, Tarn), Spain (1927: Cadiz; Cercedilla) and North Africa (1927: Tétouan, Morocco; Yakouren, Kabylie, Algeria; Aïn-Draham, Souk-el-Arba, Tunisia). In England, Germany, Austria, the Faroe Islands, Iceland, Italy, Roumania, Yugoslavia and the greater part of France the brachypterous form (the typical form or the

form *renati* Jeannel) would be the only one. LINDROTH (1945: 659), apparently, has the same opinion: "Bei uns, wie überhaupt in W.- und N.-Europa, ist der Käfer konstant brachypter...". The results of my investigations are not in agreement with these views: macropterous specimens were frequently found in Dutch material (52 among 282 specimens = 18%), in material from Western Germany (8 among 44 specimens = 18%), and in material from the Caucasus (1 among 4 specimens). The *obtusus* specimens that I saw from other regions were all brachypterous: 8 from Scandinavia, 7 from Central Europe (6 from Austria), and 120 from Iceland. Within the Netherlands macropterous specimens were found in most *obtusus*-populations (these data will be published separately). In this connection it would be worth while to study large samples of *T. obtusus* from all parts of its range.

Trechus quadristriatus is distributed throughout Europe (except the Faroe Islands) and Western Asia (JEANNEL, 1927, 1941). I saw material from the Netherlands (176 specimens), from Western Germany (60), from Scandinavia (about 250), from Wellesbourne, England (70) and from Drahanoviče, Czechoslovakia (333).

ACKNOWLEDGEMENTS

It is a pleasant duty for the author to thank those who made his investigation possible by kindly sending *Trechus* specimens, viz., Mr. S. FINCH, National Vegetable Research Station, Wellesbourne, England; Dr. F. JANCZYK, Naturhistorisches Museum, Wien, Austria; Prof. Dr. D. J. KUENEN, Zoölogisch Laboratorium, Leiden, Netherlands; Dr. B. NOVÁK, Universita Palackénov Olomouci, Czechoslovakia; Dr. H. ROER, Zoologisches Forschungsinstitut und Museum Alexander Koenig, Bonn, Western Germany; Mr. K. VEGTER, Emmen, Netherlands; Mr. H. WALDÉN, Naturhistoriska Museet, Göteborg, Sweden; Dr. J. T. WIEBES, Rijksmuseum van Natuurlijke Historie, Leiden, Netherlands; and the late P. VAN DER WIEL, Doorwerth, Netherlands.

ZUSAMMENFASSUNG

Der taxonomische Status von *Trechus obtusus* Er. hat viel Verwirrung gegeben in der Literatur. Tabelle 1 gibt eine Übersicht von dieser Verwirrung. Um die Bedeutung für die Diagnostik der aüsserlichen Merkmale, welche in der Literatur benutzt werden zur Trennung von *T. obtusus* und *T. quadristriatus* Schrk., objectiv beurteilen zu können, wurden diese Merkmale quantifiziert und an vielen Exemplaren aus den Niederlanden, West-Deutschland, Skandinavien, der Tsechoslowakei, England und Island gemessen. Die einzige aüsserliche Merkmale, welche sich als verwendbar für die Trennung der beiden Arten herausstellten, sind: die Breite der Schläfe, und der Abstand zwischen den Supraorbitalsetae und dem Innerrande des Auges. Die Frequenzverteilungen dieser quantitativen Merkmale werden verglichen und besprochen. Die Verbreitung der macropteren und brachypteren Form von *T. obtusus* wird besprochen.

REFERENCES

APFELBECK, V., 1904. — Die Käferfauna des Balkanhalbinsel, 1, Caraboidea. Berlin : 129.

BOER, P. J. DEN, 1958a. — Activiteitsperioden van loopkevers in Meijendel. Ent. Ber. 18 : 80—89.

———, 1958b. — De loopkevers van Meijendel, II. Activiteitsperioden in 1953. De Levende Natuur 61 : 88—95, 111—115.

BRAKMAN, P. J., 1961. — Korte coleopterologische Notities IV. Ent. Ber. 21 : 8—21.

CSIKI, E., 1946. — Die Käferfauna des Karpatenbeckens, 1. Allgemeiner Teil und Caraboidea. Budapest : 270 + 271.

DAHL, see MROZEK-DAHL.

ERICHSON, 1837. — cited by JEANNEL, 1927 : 303.

EVERTS, Ed., 1898. — Coleoptera Neerlandica, I. 's-Gravenhage : 65.

———, 1922. — Ibid., III. 's-Gravenhage : 23 + 24.

GANGLBAUER, L., 1892. — Die Käfer von Mitteleuropa, 1, Caraboidea. Wien : 192.

HORION, A., 1941. — Faunistik der deutschen Käfer, I, Adephaga-Caraboidea : 176 + 177.

JEANNEL, R., 1927. — Monographie des Trechinae. L'Abeille 33 : 292—301 + 303—309.

———, 1941. — Coléoptères Carabiques, 1. partie. Faune de France 39 : 327—329.

JONGE, H. DE, 1963. — Inleiding tot de medische statistiek 1, 2e ed. Leiden : 293—300.

KUHNT, P., 1913. — Illustrierte Bestimmungs-Tabellen der Käfer Deutschlands. Stuttgart : 69.

LINDROTH, C. H., 1943. — Zur Systematik fennoskandischer Carabiden, 16. Ent. Tidskr. 64 : 13.

———, 1945. — Die Fennoskandischen Carabidae, I, spezieller Teil; Göteborgs Kungl. Vetensk. Vitterh. Samh. Handl. [B., B.] 4 (1): 657—661.

MROZEK-DAHL, T., 1928. — Coleoptera I: Carabidae. Die Tierwelt Deutschlands 7 : 83.

MUNSTER, Th., 1926. — cited by LINDROTH, 1943.

PANDELLÉ, 1867. — cited by JEANNEL, 1927 : 303.

PUTZEYS, 1870. — cited by JEANNEL, 1927 : 303.

REDTENBACHER, W., 1858. — Fauna Austriaca, die Käfer, Ed. II. Wien : 70.

REITTER, Ed., 1903. — Uebersicht der Arten der Carabidengattung Trechus Clairv. Wien Ent. Ztschr. 22 : 1—7.

———, 1908. — Fauna Germanica, Die Käfer des Deutschen Reiches, 1. Stuttgart : 127.

SCHAUM, 1860.— cited by JEANNEL, 1927 : 303.

SEIDLITZ, 1891. — cited by JEANNEL, 1927 : 303.

THOMSON, 1859. — cited by JEANNEL, 1927 : 303.

VAART, H. R. VAN DER, 1950. — Gebruiksaanwijzing voor de toets van Wilcoxon; Rapport S 32 (M4) v. Statistische Afd. Mathem. Centrum, Amsterdam.

WABEKE, D. & EEDEN, C. VAN, 1955. — Handleiding voor de toets van Wilcoxon; Rapport S 176 (M65) v. Statistische Afd. Mathem. Centrum, Amsterdam.

Tijdschrift voor Entomologie

Het verschijnt in één deel van 350—450 bladzijden per jaar, bestaande uit enkele afleveringen.

Entomologische Berichten

Deze zijn bestemd voor de publicatie van kortere artikelen, faunistische notities etc., alsmede van de Verslagen der Vergaderingen en van mededelingen van het bestuur. Zij verschijnen twaalf maal per jaar in een aflevering van 16 of meer bladzijden, die samen een deel vormen.

Trichopterorum Catalogus

Deze Catalogus van F. C. J. Fischer wordt door de Vereeniging voor rekening van de auteur uitgegeven. Alle bekende recente en fossiele soorten van de gehele wereld met hun synoniemen worden er in behandeld. Delen I en II kosten f 39.— per stuk, delen III—V: f 45.—. Er zullen in totaal 15 delen verschijnen. Van alle delen zijn ook éénzijdig bedrukte exemplaren beschikbaar. De prijsverhoging hiervoor bedraagt f 2.50.

Entomologia Experimentalis et Applicata

Dit tijdschrift wordt uitgegeven door de Noord-Hollandse Uitgevers Maatschappij te Amsterdam in opdracht van de Vereeniging. Het publiceert artikelen over experimentele biologie en oekologie bij insecten en andere land-arthropoden. Het verschijnt vier maal per jaar en bevat 320 bladzijden. De prijs voor leden bedraagt f 25.—, voor niet-leden f 40.— per jaar.

Alle zakelijke correspondentie betreffende de Vereeniging te richten aan de Secretaris, W. Hellinga, Weesperzijde 23II, Amsterdam-O.

Alle correspondentie over de redactie van het Tijdschrift voor Entomologie en de Monographieën te richten aan de Redacteur, Dr. A. Diakonoff, Rijksmuseum van Natuurlijke Historie, Leiden.

Alle correspondentie over de redactie van de Entomologische Berichten te richten aan de Redacteur, B. J. Lempke, Oude IJselstraat 12III, Amsterdam-Z. 2.

Alle correspondentie over de redactie van Entomologia Experimentalis et Applicata te richten aan de Redacteur, Dr. P. A. van der Laan, Lab. voor Toegepaste Entomologie, Linnaeusstraat 2 B, Amsterdam.

Alle betalingen te richten aan de Penningmeester, Drs. H. Wiering, Doorntjes 29, Bergen (N.H.), postgiro 188130, ten name van de Nederlandsche Entomologische Vereeniging te Bergen (N.H.).

Alle correspondentie betreffende de Bibliotheek der Vereeniging te richten aan de Bibliotheek, Zeeburgerdijk 21, Amsterdam-O.

Notice to Subscribers

All correspondence referring to subscriptions and exchange of the periodicals of the Netherlands Entomological Society should be addressed to the Librarian, Zeeburgerdijk 21, Amsterdam-O, Netherlands.

NOTICE TO CONTRIBUTORS

Contributors will receive free of charge fifty reprints of their papers, joint authors have to divide this number between them at their discretion. Additional reprints may be ordered when returning proofs.

Manuscripts should be written in Dutch, English, French, German or Italian. If they contain descriptions of new genera, species, etc., they should be in one of the four last mentioned languages.

The author should communicate with the editor before submitting his manuscript. He will enclose with manuscript a Synopsis (Abstract), styled according to recommendations of the UNESCO (style rules will be provided by the editor) and, if needed, a Summary. Papers in Dutch should contain an Abstract and/or a Summary in one of the four other languages.

Manuscripts should be typewritten in double spacing on only one side of the paper, with a margin of at least three cm at the left side of each sheet. Paragraphs should be indented. Carbon copies cannot be accepted, as handling makes them illegible.

Captions for text figures and plates should be written on a separate sheet in double spacing, numbered consecutively in arabic numerals; the use of a, b, c, or any other subdivision of the figure numbering should be avoided.

Drawings for reproduction should be on good paper in Indian ink, preferably at least one and a half times as large as the ultimate size desired. Lettering should be uniform, and, after reduction, of the same size. Photographs should be furnished as shiny positive prints, unmounted. Plates should be arranged so as to fill a whole page (11.5 x 19 cm) of the *Tijdschrift,* or a portion thereof, captions included. Combinations of illustrations into groups are preferable to separate illustrations, since there is a minimum charge per block.

Names of genera and lower systematic categories, new terms and the like are to be underlined by the author in the manuscript by a single straight line. Any other directions as to size or style of the type are given by the editors, not by the author. Italic type or spacing to stress ordinary words or sentences is to be avoided. Dates should be spelled as follows: either "10.V.1948" or "10 May, 1948". Other use of latin numerals should be avoided, as well as abbreviations in the text, save those generally accepted. Numbers from one to ten occurring in the text should be written in full, one, two, three, etc. Titles must be kept short. Footnotes should be kept at a minimum.

Bibliography should not be given in footnotes but compiled in a list at end of the paper, styled as follows:

Mosley, M. E., 1932, "A revision of the European species of the genus *Leuctra* (Plecoptera)". — Ann. Mag. Nat. Hist. [10] 10 (3): 1—41, pl. 1—5, fig. 1—57. Number of issue should only be added (in parentheses) when it has individual pagination.

Text references to this list might be made thus:

"Mosley (1932) says...." or "(Mosley, 1932)".

The editors reserve the right to adjust style to certain standards of uniformity.

Manuscripts and all communications concerning editorial matters only should be sent to: Dr. A. Diakonoff, Rijksmuseum van Natuurlijke Historie, Leiden, The Netherlands.

DEEL 108 AFLEVERING 10 1965

TIJDSCHRIFT VOOR ENTOMOLOGIE

UITGEGEVEN DOOR

DE NEDERLANDSCHE ENTOMOLOGISCHE VEREENIGING

INHOUD:

Tijdschrift voor Entomologie, deel 108, afl. 10 Gepubliceerd 30-XII-1965

Nederlandsche Entomologische Vereeniging

De contributie voor het lidmaatschap bedraagt f 15.—, voor student-leden f 2.50, per jaar. — Begunstigers betalen jaarlijks tenminstet f 15.—.

De leden, behalve de student-leden, ontvangen gratis de *Entomologische Berichten,* waarvan de prijs voor student-leden f 1.50 per jaar, voor niet-leden f 20.— per jaar en f 2.— per nummer bedraagt.

De leden kunnen zich voor f 10.— per jaar abonneren op het *Tijdschrift voor Entomologie*; hiervan bedraagt de prijs voor niet-leden f 35.— per jaar.

De eerder verschenen publicaties der Vereeniging zijn voor de leden tegen verminderde prijzen verkrijgbaar. De Vereeniging geeft de volgende publicaties uit.

Monographieën van de Nederlandsche Entomologische Vereeniging

Deze worden met onregelmatige tussenpozen uitgegeven. Er zijn reeds verschenen:

— F. T. Valck Lucassen et al. — Monographie du genre Lomaptera Gory & Percheron (Coleoptera, Cetoniidae), prijs f 50.—.

1. A. J. Besseling. — De Nederlandse Watermijten (Hydrachnellae Latreille, 1802), prijs f 25.—.

CATALOGUS DER NEDERLANDSE MACROLEPIDOPTERA (TWAALFDE SUPPLEMENT)

DOOR

B. J. LEMPKE

Amsterdam

ABSTRACT

This Supplement of the Catalogue contains the greater part of the Dutch species of the subfamily Amphipyrinae of the family Noctuidae.

The following particulars for each species are presented: the time of appearance, where known the biotope which it prefers, localities additional to those mentioned in my original Catalogue (except for common species met with everywhere in the country), and the variation.

AMPHIPYRINAE

Amphipyra Ochsenheimer

Amphipyra pyramidea L. *Tijdschr. Entom.* 90: 87; Cat. VIII: (497). Uit de verbreidingskaart (fig. 42) blijkt duidelijk, dat de soort vooral in bosachtige gebieden in het oosten en zuiden van het land voorkomt, maar dat ook vrij veel vindplaatsen in het Duindistrict, het Hafdistrict en het Fluviatiel District bekend zijn. Dat de vlinder hier werkelijk thuis hoort, blijkt wel uit de volgende opmerkingen van verzamelaars: Beemster, vrij gewoon (HUISENGA), Rotterdam, de rupsen in het voorjaar van 1954 talrijk op iep, vooral op het uitschot van de stammen (ELFFERICH), Hendrik-Ido-Ambacht, vrij gewoon (BOGAARD), Schelluinen, gewoon (SLOB). In het Waddendistrict is *pyramidea* aangetroffen op Terschelling.

De vliegtijd kan in het najaar nog iets langer duren dan in 1949 bekend was. De uiterste data worden nu: 10.VII—19.X. De vroegste datum werd in 1950 te Haaren-N.B. waargenomen (KNIPPENBERG), de laatste in 1962 te Assel (VAN AARTSEN).

V a r i a b i l i t e i t. Zoals reeds in Cat. VIII werd opgemerkt, is de vlinder zeer variabel, maar een indeling van de vormen is niet altijd gemakkelijk, daar verscheidene ervan zonder scherpe grenzen in elkaar overgaan.

f. *virgata* Tutt, 1892. Exemplaren met duidelijk afstekend donker middenveld van de voorvleugels komen toch weinig voor. Nieuwe vindplaats: Geulem (LEEFMANS).

f. *melaleuca* Lenz, 1927. Ook deze vorm met zwartachtige voorvleugels, waartegen de witte dwarslijnen scherp afsteken, is niet gewoon. Nieuwe vindplaatsen: Apeldoorn, Hoenderlo (LEFFEF, in Zoöl. Mus.); Amsterdam, e. l. (Zoöl. Mus.).

f. *fusca* Rocci, 1914. Exemplaren met roetkleurige, dus zwartbruine voorvleugels, die onduidelijk getekend zijn, werden nog bekend van Diepenveen (LUKKIEN) en Apeldoorn (LEFFEF).

Fig. 42. Verbreiding van *Amphipyra pyramidea* L. in Nederland

f. *pallida* Lambillion, 1908. Deze naam kan gebruikt worden voor alle exemplaren met opvallend lichte voorvleugels. Nieuwe vindplaatsen: Apeldoorn (LEFFEF, in Zoöl. Mus.); Ulenpas (Hoog-Keppel) (LEFFEF); Slijk-Ewijk (VAN DE POL); Eindhoven (VERHAAK). Een extreem licht ♀ van Twello (J. VERBURGH).

f. **marginata** nov. Bovenzijde voorvleugels: ruimte tussen golflijn en achterrand veel lichter dan de grondkleur (bij het holotype ook het grootste deel van de achtervleugels lichter). Amsterdam, ♀, 16.VIII.1955 (holotype, PEERDEMAN).

[Upper side fore wings: the area between submarginal line and fringe is much paler than the ground colour (the hind wings of the holotype are also for the greater part much paler).]

f. *reducta* Lempke, 1949. Exemplaren zonder ronde vlek werden nog bekend van Apeldoorn (LEFFEF, in Zoöl. Mus.); Bergeijk, Epen (VAN WISSELINGH); Asten (Zoöl. Mus.).

f. *striata* Lempke, 1949. Exemplaren met wortelwaarts uitgerekte pijlvlekken werden nog aangetroffen te: Apeldoorn, Lochem (Zoöl. Mus.); Aerdenhout, Epen, Schin op Geul (VAN WISSELINGH).

f. *lineata* Lempke, 1949. Komt wel overal onder de soort voor, zodat geen nieuwe vindplaatsen meer vermeld worden.

f. **unicolor** nov. Voorvleugels eenkleurig bruinachtig, eerste en tweede dwarslijn enkel; van de verdere tekening is alleen de wortelstreep, de ronde vlek, en de donkere vlek voor de niervlek aanwezig. Apeldoorn, juli 17 (1917?) (holotype, CARON).

[Fore wings unicolorous brownish, antemedian and postmedian single, the further markings only consist of the basal line, the orbicular and a dark spot before the reniform.]

Dwerg. Apeldoorn (LEFFEF, in Zoöl. Mus.).

Amphipyra perflua Fabricius. *Tijdschr. Entom.* 90: 87; Cat. VIII: (497). Na de vondst van 1913 nooit meer in ons land aangetroffen. Ook uit het omringende gebied is weinig nieuws bekend geworden. Voor Denemarken meldt HOFFMEYER in de tweede druk van De Danske Ugler (1962) nu ook een vangst op Bornholm (p. 205). Bij Hamburg werd de vlinder voor het laatst in 1878 gezien, terwijl in 1945 twee rupsen bij de stad Sleeswijk werden gevonden (*Bombus* 1: 145, 1947). In België werd *perflua* in 1963 en 1964 te Buzenol (in Belgisch Luxemburg, bij Virton) gevangen (*Linn. Belg.* 2: 127, 1964, 3: 69, 1965; *Lambillionea* 63: 22, 1964).

Eén van de twee Nederlandse exemplaren is afgebeeld op plaat 11, fig. 1.

Amphipyra tragopoginis L. *Tijdschr. Entom.* 90: 86; Cat. VIII: (496). Met uitzondering van Rottum is de soort nu op alle waddeneilanden gevonden.

De vliegtijd kan nog langer duren dan in 1949 werd opgegeven. De uiterste grenzen worden nu: 9.VII—9.X. De late vangst is afkomstig van de Rivon-lamp te Haamstede in 1962 (LEFFEF).

Variabiliteit. f. *nigrescens* Spuler, 1906. Exemplaren met zwartachtige voorvleugels zijn niet al te zeldzaam. Er zijn zoveel nieuwe vindplaatsen, verspreid over vrijwel het hele land, dat een opsomming ervan achterwege kan blijven.

f. *grisea* Vorbrodt, 1921. De vorm met grijze voorvleugels is stellig zeldzaam. Ik zag slechts een ♂ van Amsterdam en een ♀ van Cadzand (PEERDEMAN).

f. *variegata* Lempke, 1949. Exemplaren met licht franjeveld van de voorvleugels werden nog bekend van: Apeldoorn, Weesp (Zoöl. Mus.); Amsterdam, Amsterdamse Bos (PEERDEMAN); Melissant (HUISMAN); Hendrik-Ido-Ambacht (BOGAARD); Geulem (BOTZEN).

f. *demaculata* Nordström, 1939. Nieuwe vindplaatsen van exemplaren zonder de zwarte stippen op de voorvleugels: Groessen, Heemstede (VAN DE POL); Westenschouwen (LEFFEF, in Zoöl. Mus.); Nuenen (NEIJTS).

f. *conjuncta* Lempke, 1949. Nieuwe vindplaatsen: Raalte (FLINT); Hollandse Rading (Zoöl. Mus.); Melissant (HUISMAN); Epen (VAN WISSELINGH).

f. **venata** nov. De aderen op de voorvleugels over de hele lengte zwartachtig. Niet al te zeldzaam. Wijster, Apeldoorn, Hoenderlo, Berg en Dal, Hollandse Rading, Amsterdam, Den Haag (Zoöl. Mus.); Wassenaar, Epen (VAN WISSELINGH).

Holotype: ♂ van Apeldoorn, 27.VIII.1954, LEFFEF leg., in Zoöl. Mus.

[The nervures on the fore wings over their whole length blackish.]

Dwergen. Tongeren, Apeldoorn, Blaricum, Haarlem (Zoöl. Mus.); de Voorst (S. R. DIJKSTRA); Beemster (HUISENGA); Castricum (AUKEMA); Bergeijk (VAN WISSELINGH); Belfeld (OTTENHEIJM); Eijs (VAN DE POL).

Mormo Ochsenheimer

Mormo maura L. *Tijdschr. Entom.* 90: 85; Cat. VIII: (495). Het hoofdverspreidingsgebied in Nederland blijft het zuiden van Limburg. Daarnaast komen een paar nieuwe vindplaatsen in midden-Limburg, het midden van Noord-Brabant en als grote verrassing een vangst in Friesland, mogelijk weer een ver van zijn normale woongebied afgedwaalde zwerver.

Geen correctie op de vliegtijd, waarvan de uiterste data dus blijven: 12.VI—19.IX.

Vindplaatsen. Fr.: Bakkeveen, 11.VIII.1962, één exemplaar op smeer (G. STOBBE). Ov.: Volthe (KNOOP). N.B.: Tilburg, in 1942 verscheidene exemplaren (A. DE BOER). Lbg.: Grubbenvorst, Roggel, Swalmen, Stein, Vaesrade, Wittem, Schin op Geul, Rijckholt, Camerig, Vijlen.

Variabiliteit. f. *ocjoviensis* Biezanko, 1924. Nieuwe vindplaatsen van deze somber uitziende vorm: Denekamp, Valkenburg (Zoöl. Mus.); Epen (VAN WISSELING).

f. *virgata* Tutt, 1892. Vrij gewoon.

f. *striata* Tutt, 1892. Nieuwe vindplaatsen: Valkenburg, Epen (VAN WISSELINGH).

f. **unicolor** nov. Voor- en achtervleugels eenkleurig donkerbruin, vlekken en de beide dwarslijnen zwak zichtbaar; de lichte postdiscale lijn op de achtervleugels flauw aanwezig. Cortenbach (Voerendaal), ♂, 7.VIII.1928 (holotype), Geulem, ♂, 19.VII.1950 (Zoöl. Mus.).

[Fore and hind wings unicolorous dark brown; stigmata and the two transverse lines feebly visible; the pale postdiscal line on the hind wings obsolete.]

f. **nigrescens** nov. Grondkleur van voor- en achtervleugels bruinachtig zwart. Epen, ♂, 23.VII.1959 (holotype, LEFFEF, in Zoöl. Mus.).

[Ground colour of fore and hind wings brownish black.]

f. *juncta* Lempke, 1949. Nieuwe vindplaats: Epen (VAN WISSELINGH).

Dypterygia Stephens

Dypterygia scabriuscula L. *Tijdschr. Entom.* 90: 84; Cat. VIII: (494). De

vlinder is nu ook bekend van Schiermonnikoog, zodat alleen Ameland en Rottum nog in de lijst van de waddeneilanden ontbreken. Verder werden nog enkele nieuwe vindplaatsen buiten de zandgronden bekend: Slijk-Ewijk (VAN DE POL), Hoorn (HOUTMAN), Amsterdam-Slotermeer (WITMOND), Rotterdam (VAN DER AA), Schelluinen (één exemplaar in 1955, SLOB), Arkel, Hendrik-Ido-Ambacht (1963, BOGAARD) en Melissant.

Een exceptioneel vroeg exemplaar ving VAN DER AA op 25 maart 1959 te Rotterdam. De laatste datum van de eerste generatie wordt nu: 4.VIII (in 1947 een afgevlogen dier te Bennekom). De eerste datum van de tweede generatie is 9.VIII (in 1953 te Bennekom, gevolgd door andere verse exemplaren op 10.VIII en 13.VIII). Al deze gegevens genoteerd door VAN DE POL.

Variabiliteit. f. *pinastri* L., 1761. Exemplaren met werkelijk zwartachtige grondkleur van de voorvleugels (en dan ook donkerder achtervleugels) blijven vrij zeldzaam. Nieuwe vindplaatsen: Nierssen (LEFFEF leg.), Bussum, Den Haag (Zoöl. Mus.); Aerdenhout (VAN WISSELINGH); Nuenen (NEIJTS); Montfort (MAASSEN).

f. *confluens* Lempke, 1949. Nieuwe vindplaatsen: Overveen, Wassenaar (VAN WISSELINGH); Leiden (LUCAS).

Dwergen. Cadzand (PEERDEMAN); Venlo (Zoöl. Mus.).

Rusina Stephens

Rusina ferruginea Esper, [1785] (*Phalaena umbratica* Goeze, 1781, nec Linnaeus, 1758; *tenebrosa* Hübner, [1800—1803]). *Tijdschr. Entom.* 90: 85; Cat. VIII: (495). De naam, waaronder de soort lange jaren bekend is geweest, is ongeldig, daar hij een primair homoniem is.

De vlinder wordt maar zelden buiten de in Cat. VIII aangegeven biotopen aangetroffen. Bekend werden de vindplaatsen Nijetrijne (in 1964, LEFFEF), Heteren en Melissant (beide in 1963, HUISMAN) en Hendrik-Ido-Ambacht, een ♀ in 1963 (BOGAARD). In het Waddendistrict is het dier nu ook aangetroffen op Vlieland en Terschelling, zodat, net als bij de vorige soort, Ameland en Rottum nog ontbreken.

Op de vliegtijd is geen correctie, zodat de uiterste data dus blijven: 22.V—4.VIII.

Variabiliteit. ESPER beschrijft de grondkleur wel als roodbruin, maar zijn figuren geven afbeeldingen van vlinders met een vrij donkerbruine grondkleur. HÜBNER's fig. 158 is iets donkerder en vooral veel nauwkeuriger dan die van ESPER. Beide auteurs beelden bonte dieren af met donkere banden op de voorvleugels. De typische vorm is dan ook die, waarbij vooral het ♂ op een bruinachtige grondkleur een donkere middenschaduw heeft en een donkere band voor de tweede dwarslijn, terwijl vaak ook het franjeveld en de voorrand donker zijn. Tot deze vorm behoort de grote meerderheid van onze exemplaren.

f. *obscura* Tutt, 1892. De vorm met zwartachtig bruine voorvleugels, waartegen de donkere banden dus niet meer afsteken, terwijl de niervlek wel licht geringd is, komt bij beide seksen voor en is vooral bij het ♂ niet zeldzaam. Nieuwe vindplaatsen: Eelde, Wiessel, Dabbelo, Vorden, Heemskerk (Zoöl. Mus.); Ermelo (VAN DER MEULEN); Slijk-Ewijk (VAN DE POL); Aerdenhout, Epen (VAN WISSELINGH); Meijendel, Oostvoorne (LUCAS).

f. ♂ **concolor** nov. Voorvleugels eenkleurig bruin, niet verdonkerd; de tekening bestaat slechts uit twee (meestal vrij zwakke) dwarslijnen en de niervlek. Een bij het ♂ zeker niet zeldzame vorm. Putten, Hoenderlo, Renkum, Oosterbeek, Soest, Bergen op Zoom, Breda (Zoöl. Mus.); Zeist (GORTER).

Holotype: ♂ van Renkum, 26.VI.1907, in genoemd museum.

[Fore wings unicolorous brown, not darkened; the markings consist of the two transverse lines (which may be rather feeble) and the reniform. The form is not rare with the male.]

f. *phaeus* Haworth, 1803. De vorm met grijsachtig bruine bont getekende voorvleugels werd nog bekend van Bussum, Venlo (Zoöl. Mus.); Aerdenhout (VAN WISSELINGH).

f. *bellieri* Culot, 1914. Nieuwe vindplaats van deze vorm met zwak getekende eenkleurig licht bruingrijze voorvleugels: Bennekom (VAN DE POL).

f. **demaculata** nov. Bovenzijde voorvleugels: eerste en tweede dwarslijn scherp getekend, maar ronde vlek en niervlek ontbreken volkomen. Plaat 11, fig. 3. Bergeijk, ♂, 7.VII.1961 (holotype, VAN WISSELINGH).

[Upper side fore wings: antemedian and postmedian sharply marked, but orbicular and reniform fail completely. Plate 11, fig. 3.]

Dwergen. Austerlitz, Zeist (GORTER).

Thalpophila Hübner

Thalpophila matura Hufnagel. *Tijdschr. Entom.* 85: 124; Cat. VII: (451). Een vrij groot aantal nieuwe vindplaatsen zijn bekend geworden in de in 1943 aangegeven biotopen, waaruit blijkt dat de vlinder vooral in de duinen sterk verbreid is. Daarnaast werden ook enkele exemplaren gevangen in het Hafdistrict en het Fluviatiel District, die ongetwijfeld wel grotendeels tot de rubriek van de zwervers gerekend zullen moeten worden. In het Waddendistrict is *matura* bekend van alle eilanden met uitzondering van Rottum (op Terschelling zeer gewoon, LEFFEF).

Op de vliegtijden zijn geen correcties, zodat de uiterste data blijven: 17.VII—22.IX.

V i n d p l a a t s e n. Fr.: Vlieland, Sexbierum (1962, 1963, STOBBE). Dr.: Schoonlo, Odoornerveen, Vledder, Havelte. Ov.: Markelo, Frieswijk. Flevoland: Lelystad. Gdl.: Harderwijk, Vierhouten, Assel, Uchelen, Hoenderlo, Otterlo, Harskamp, Lunteren, Ede; Slijk-Ewijk. Utr.: Hollandse Rading. N.H.: Amsterdam (1959, PEERDEMAN), Sloterdijk (NIEUWLAND), Zaandam (1957, AUKEMA), de Koog, Hargen, Groet, Schoorl, Bergen, Egmond aan Zee, Bakkum, Heemskerk, Beverwijk, Haarlem, Heemstede. Z.H.: Schevingen, Kijkduin, Staelduin, Sliedrecht, één exemplaar in 1959 overdag vliegend (BOGAARD), Oostvoorne, Hellevoetsluis, Ouddorp. Zl.: Burgh, Haamstede, Westenschouwen, Oostkapelle, Valkenisse, Groede, Cadzand. N.B.: Hoogerheide, Oosterhout, Dorst, Chaam, Hilvarenbeek, Waalwijk, Drunen, Haaren, Sint Michielsgestel, Oirschot, Vessem, Bergeijk, Nuenen, Eindhoven, Geldrop, Someren, Gassel. Lbg.: Milsbeek, Bergen, Velden, Tegelen, Swalmen, Montfort, Peij, Stein, Vijlen, Vaals.

V a r i a b i l i t e i t. Het verschil tussen de populaties uit het duingebied en die uit het binnenland is niet zo absoluut als in 1943 leek. Bij uitzondering komen in de duinen ook wel donkere dieren voor, zoals blijkt uit de vangst van zo een exemplaar te Aerdenhout (VAN WISSELINGH), één op Schiermonnikoog en enkele op

Terschelling (Zoöl. Mus.), terwijl de lichte vorm ook wel in het binnenland kan worden aangetroffen. Een serie *matura* van Hilversum in het Zoöl. Mus. bevat diverse lichte dieren naast een aantal donkere. In dezelfde collectie bevinden zich ook twee lichte exemplaren van Apeldoorn (1894) en Wientjesvoort. Maar in series naast elkaar geplaatst is het verschil duidelijk.

f. *connexa* Hübner, [1809—1813]. Exemplaren met duidelijk roodachtige grondkleur van de voorvleugels komen weinig voor. Nieuwe vindplaatsen: Zeist (GORTER); Laren-N.H. (Zoöl. Mus.); Meijendel, Oostvoorne (LUCAS); Den Haag (Leids Mus.).

f. *texta* Esper, [1787]. Exemplaren met eenkleurige, maar duidelijk getekende voorvleugels werden nog bekend van: Ermelo (Zoöl. Mus.); Meijendel, Oostvoorne, Peij (LUCAS); Bergeijk (VAN WISSELINGH); Swalmen (MAASSEN).

f. **obscura** nov. Voorvleugels bovenzijde zwartbruin met flauw zichtbare tekening, onderzijde eenkleurig zwartachtig; achtervleugels donkerder geel. Plaat 11 fig. 2. Westenschouwen, ♂, VIII.1961 (holotype, LEFFEF, in Zoöl. Mus.); Breda (Leids Mus.); Chaam (LUKKIEN); Bergeijk (VAN WISSELINGH); Sint Pieter (VAN DER MEULEN).

[Fore wings upper side black-brown, markings obsolete, under side unicolorous blackish; hind wings darker yellow.]

f. **albisignata** nov. Voorvleugels: de eerste en tweede dwarslijn, de golflijn, de franjelijn en de omranding van ronde vlek en niervlek fel wit, scherp afstekend. Zeist, ♀, 22.VII.1953 (holotype, GORTER).

[Fore wings upper side black-brown, markings obsolete, under side unicolorous blackish; as well as the circumscriptions of orbicular and reniform pure white, sharply contrasting.]

f. *wahlgreni* Nordström, 1940. Overveen (VAN WISSELINGH).

f. *conjuncta* Lempke, 1943. Exemplaren met de zwarte tapvlekstreep komen blijkbaar niet veel voor. Nieuwe vindplaatsen: Bilthoven (BROUWER); Meijendel (LUCAS).

Dwergen. Lelystad (VAN DE POL); Velp (Leids Mus.); Bakkum (S. DE BOER).

Trachea Ochsenheimer

Trachea atriplicis L. *Tijdschr. Entom.* 85: 127; Cat. VII: (455). Uit de combinatie van beide lijsten van vindplaatsen blijkt duidelijk, dat de vlinder in vrijwel het hele land kan worden aangetroffen, al is hij op vochtige gronden in de regel gewoner dan op droge. In het Waddendistrict nu bekend van Vlieland en Terschelling.

(Merkwaardig is de enorme achteruitgang van de soort op de Britse eilanden. De laatste vangst, die in de nieuwe editie van „SOUTH" wordt vermeld, dateert van 1915 (Moths Brit. Isles 1: 275, 1961). Het dier wordt er op het ogenblik als uitgestorven beschouwd).

Beide generaties kunnen vroeger gaan vliegen dan in 1943 werd vermeld. De uiterste data worden nu: de eerste van 11.V—11.VIII, de tweede van 20.VIII—19.X. In warme zomers kan de tweede generatie vrij gewoon zijn. Op 18 september 1947 ving BOTZEN 14 stuks op smeer te Vinkeveen en Baambrugge. In de regel echter zijn herfstexemplaren zeldzaamheden.

Vindplaatsen. Fr.: Terschelling, Vlieland, Leeuwarden, Tietjerk, Duurswoude, Fochtelo, Beetsterzwaag, Olterterp, Oude Mirdum, Tjerkwerd. Gr.: Zevenhuizen (Leek), Onnen, Glimmen, Noordlaren, Borgercompagnie, Veendam, Vlagtwedde. Dr.: Paterswolde, Peize, Roden, Norg, Donderen, Zuidlaren, Schipborg, Eext, Schoonlo, Odoorn, Vledder. Ov.: Denekamp, Volthe, Rossum, Ootmarsum, Hezingen, Losser, Saasveld, Almelo, Aadorp, Ommen, Oud-Leusen, Rijssen, Holten, Raalte, Abdij Sion, Frieswijk, Tjoene, Loo (Bathmen), Platvoet, Zwartsluis, Vollenhove. Gdl.: Terschuur, Harderwijk, Hattem, Wapenveld, Tongeren, Epe, Wiessel, Hoog-Soeren, Assel, Uchelen, Teuge, Laag-Soeren, Hoenderlo, Kootwijk, Velp, Lunteren; Gorssel, de Velhorst, Hackfort, Ruurlo, Woold, Hoog-Keppel, Laag-Keppel, Didam, Loerbeek; Hatert, Heteren, Ingen, Buren, Geldermalsen, Culemborg. Utr.: Driebergen, Amersfoort, Maarssen, Maarsseveen, Vreeland, Vinkeveen, Baambrugge. N.H.: 's-Graveland, Naarden, Weesp, Amsterdamse Bos, Halfweg, Schellingwoude, Landsmeer, Zaandam, Middelie, Beemster, Oosthuizen, Hoorn, Overveen, Aerdenhout. Z.H.: Woerdense Verlaat, Noorden, Den Haag, Capelle aan den IJssel, Kralingerhout, Hendrik-Ido-Ambacht, Schelluinen, Gorkum, Arkel, Dubbeldam, Zuidhollandse Biesbosch, Hellevoetsluis. Zl.: Burgh, Haamstede, Westenschouwen, Oostkapelle, Valkenisse. N.B.: Waalwijk, Drunen, Nieuwkuik, Sint Michielsgestel, Uden, Kampina, Best, Vessem, Bergeijk, Valkenswaard, Tongelre, Geldrop, Someren, Maarheeze, Helenaveen, Sint Anthonis. Lbg.: Griendsveen, Sevenum, Weert, Venlo, Tegelen, Swalmen, Montfort, Stein, Amstenrade, Klimmen, Bocholtz, Bunde, Gronsveld, Vijlen, Lemiers.

Variabiliteit. f. *diffusa* Spuler, 1906, Schmetterl. Eur. 1: 210 (*enarismene* Slastshevsky, 1908). De vorm met onscherpe tekening op de voorvleugels en nauwelijks zichtbare witte vlek (zoals SPULER hem uitstekend beschrijft) is bij ons beslist zeldzaam. Nieuwe vindplaatsen: Almelo (KLEINJAN); Wiessel (LEFFEF); Ingen (Zoöl. Mus.).

f. *inornata* Alpheraky, 1908. De vorm zonder groene tint op de voorvleugels (maar overigens niet afwijkend) is eveneens zeldzaam. Nieuwe vindplaatsen: Loerbeek (PEERDEMAN); Bergeijk (VAN WISSELINGH). Overgangen met heel weinig groen van Soest en Vreeland (Zoöl. Mus.).

f. **nigrescens** nov. Sterk verdonkerd. Lichaam en voorvleugels zwartachtig; achtervleugels eveneens verdonkerd. Plaat 15 fig. 2. Bij de twee exemplaren, die ik gezien heb, is de groene kleur ook gereduceerd. Onnen, ♂, 16.VI.1961 (holotype), Glimmen (VAN DE POL).

[Strongly darkened. Body and fore wings blackish; hind wings also darkened. The two specimens I saw of this form had the green colour also much reduced.]

f. *viridimaculata* Lempke, 1943. Een exemplaar met eenkleurig groene ronde vlek van Breda (Zoöl. Mus.).

f. *juncta* Lempke, 1943. Een exemplaar, waarbij ronde vlek en niervlek elkaar raken, van Ootmarsum (VAN WISSELINGH).

Dwerg. Zeist (GORTER).

Euplexia Stephens

Euplexia lucipara L. *Tijdschr. Entom.* 85 : 126; Cat. VII: (453). Ook bij deze soort wijzen de beide lijsten van vindplaatsen op een sterke verbreiding in Nederland. Behalve op de zandgronden is de vlinder ook van tal van plaatsen in het Hafdistrict en het Fluviatiel District bekend geworden. In het Waddendistrict is *lucipara* tot nog toe alleen aangetroffen op Vlieland.

De rups is vrij polyfaag. LEFFEF vond hem veel op bosbes en varens, maar ook op wilgen en melde.

De eerste generatie kan reeds begin mei verschijnen. De grenzen van beide generaties worden nu: de eerste van 6.V—6.VIII, de tweede van 25.VIII—17.IX. (In 1953 trof VAN DE POL op 3 maart een exemplaar binnenshuis aan te Bennekom, maar dit was ongetwijfeld geforceerd).

Vindplaatsen. Fr.: Terschelling, Vlieland, Tietjerk, Eernewoude, Beetsterzwaag, Olterterp, Duurswoude, Oosterwolde, Oldeberkoop, Nijetrijne, Nije Mirdum, Oude Mirdum, Kippenburg. Gr.: Leek, Groningen, Haren, Glimmen, Noordlaren, Onnen, Borgercompagnie, Veendam. Dr.: Paterswolde, Roden, Peest, Vries, Zuidlaren, Schipborg, Eext, Schoonlo, Odoorn, Vledder. Ov.: Volthe, Rossum, Saasveld, Albergen, Nijverdal, Rijssen, Abdij Sion, Raalte, Zwartsluis, Vollenhove. Gdl.: Harderwijk, Hulshorst, Epe, Nierssen, Wiessel, Assel, Hoog-Soeren, Uchelen, Teuge, Dabbelo, Hoenderlo, Hoog-Buurlo, Kootwijk, Lunteren; Gorssel, Hackfort, Ruurlo, Woold, Hoog-Keppel, Didam, Loerbeek; Slijk-Ewijk, Geldermalsen, Neerijnen. Utr.: Soesterberg. N.H.: 's-Graveland, Blaricum, Huizen, Naarden, Naardermeer, Muiderberg, Weesp, Amsterdamse Bos (vrij gewoon, PEERDEMAN), Amsterdam, Zaandam, Nek, Beemster, Oosthuizen, Hoorn, Bergen, Alkmaar, Castricum, Bakkum, Heemskerk, Overveen, Aerdenhout, Heemstede, Vogelenzang. Z.H.: Woerdense Verlaat, Lisse, Leiden, Oegstgeest, Voorschoten, Rijswijk, Delft, Staelduin, Vlaardingen, Rotterdam (ook Kralingerhout, VAN DER AA), Schelluinen, Hendrik-Ido-Ambacht (zeldzaam, maar in 1963 niet minder dan 20 stuks, BOGAARD), Zwijndrecht, Oostvoorne, Rockanje, Hellevoetsluis, Ouddorp. Zl.: Burgh, Haamstede, Westenschouwen, Oostkapelle, Cadzand. N.B.: Galder, Dorst, Waalwijk, Sint Michielsgestel, Haaren, Kampina, Vessem, Bergeijk, Eindhoven, Nuenen, Helmond, Someren, Helenaveen, Gassel. Lbg.: Griendsveen, Sevenum, Heel, de Hamert, Arcen, Tegelen, Swalmen, Sint Odiliënberg, Merum, Montfort, Stein, Amstenrade, Thull, Heerlerbaan, Aalbeek, Geulem, Bunde, Maastricht, Sint Pietersberg, Gronsveld, Diependal, Vijlen, Bocholtz, Lemiers, Vaals.

Variabiliteit. f. **obscura** nov. De laatste jaren zijn zeer donkere exemplaren bekend geworden, die onder elkaar wel iets verschillen, maar zonder bezwaar tot dezelfde vorm gerekend kunnen worden. Lichaam sterk verdonkerd, niet zelden zelfs zwart; middenveld van de voorvleugels zwartachtig, terwijl ook de rest van de voorvleugels sterk verdonkerd kan zijn en de lichte niervlek scherp afsteekt; achtervleugels eveneens veel donkerder. Plaat 11 fig. 7. Eernewoude (G. DIJKSTRA); Borgercompagnie, Peest, Vorden, Oostdorp (Zoöl. Mus.); Onnen, Glimmen, Bennekom, Gassel (VAN DE POL); Wiessel (LEFFEF); Blaricum (VAN TUIJL); Bussum (TER LAAG); Huizen, Heemskerk (VAN AARTSEN); Amsterdamse Bos (PEERDEMAN); Swalmen (PIJPERS); Heerlerbaan (LUKKIEN).

Holotype: ♂ van Peest, 8.VI.1952, in collectie Zoöl. Mus.

[Body strongly darkened, not rarely even quite black; central area of the fore wings blackish, the rest of these wings may also be strongly darkened, whereas the reniform strongly contrasts; hind wings also much darker.]

f. *maculata* Lempke, 1943. Exemplaren met eenkleurig geelachtige niervlek werden nog bekend van: Noordlaren, Slijk-Ewijk (VAN DE POL); Velp (DE ROO); Soest, Hilversum, Weesp, Plasmolen (Zoöl. Mus.); Lunteren (BRANGER); Leiden (LUCAS).

f. *obsoleta* Lempke, 1943. Exemplaren met geheel donker gevulde niervlek zijn veel zeldzamer. Nog bekend geworden van Hoog-Soeren (LEFFEF); Bussum (TER LAAG); Zaandam (AUKEMA).

f. *flavescens* Lempke, 1943. Exemplaren met lichte geelachtige gewaterde band werden nog aangetroffen te: Lelystad, Bennekom (VAN DE POL); Doorn (Zoöl. Mus.); Zeist (BROUWER); Bussum (TER LAAG).

f. *pallida* Lempke, 1943. Een prachtig licht exemplaar werd door VAN AARTSEN gevangen te Oostkapelle (Zoöl. Mus.). Zie plaat 11 fig. 8.

f. **postmarginata** nov. Achtervleugels witachtig met brede donkere achterrand. Beemster, ♂, 4.VI.1960 (holotype, HUISENGA).

[Hind wings whitish with a broad dark marginal band.]

f. *clausa* Lempke, 1943. Exemplaren, waarbij de twee dwarslijnen elkaar aan de binnenrand van de voorvleugels raken, werden nog bekend van: Apeldoorn (LEFFEF, in Zoöl. Mus.); Bakkum (AUKEMA).

f. *semiconfluens* Lempke, 1943. Niet al te zeldzaam, zoals uit de volgende nieuwe vindplaatsen blijkt: Noordbroek, Arnhem, Hilversum, Velzen (Zoöl. Mus.).

Dwergen. Apeldoorn (LEFFEF, in Zoöl. Mus.); Nuenen (NEIJTS); Maasniel (FRANSSEN); Sint Michielsgestel (KNIPPENBERG); Montfort (MAASSEN); Nije Mirdum (MULDER); Plasmolen (Leids Mus.).

Phlogophora Treitschke

Phlogophora meticulosa L. *Tijdschr. Entom.* 85: 122; Cat. VII: (449). De vlinder is nu bekend van alle waddeneilanden met uitzondering van Ameland en Rottum en komt overigens in het gehele land op allerlei grondsoorten voor. Het aantal kan nogal schommelen. In sommige herfsten is *meticulosa* zeer gewoon (1961, 1962 bijv.), in andere veel schaarser (zoals in 1963). Natuurlijk zullen deze schommelingen in aantal voor een belangrijk deel veroorzaakt worden door oecologische factoren, maar mogelijk hebben zij ook iets te maken met de sterke neiging tot trekken of zwerven, zoals die blijkt uit herhaalde vangsten van de vlinder op het Nederlandse lichtschip Noord Hinder en op Britse lichtschepen.

De eigenschap van de soort zowel als imago als in verschillende stadia van de rups en als pop te kunnen overwinteren maakt de volgorde van de generaties tot een nogal gecompliceerde zaak. Decemberwaarnemingen van vlinders zijn de volgende: 30.XII.1943 een dood exemplaar in een sloot te Nijkerk (H. TERLOUW); 1.XII.1945 één tegen een boomstam te Twello (COLDEWEIJ); 2.XII.1945 een pas uitgekomen vlinder met nog slappe vleugels te Middelie (S. DE BOER); 14.XII. 1947 ♂ te Katwoude, 21.XII.1947 ♀ te Amsterdam (WITMOND); 13.XII.1948, vers exemplaar op straat te Leeuwarden (VAN MINNEN); 11.XII.1948, een vlinder op een boom te Babberich (POSTEMA); 28.XII.1953 te Doorn (ELFFERICH); XII.1948, e. l., Zeist (GORTER); 10.XII.1961 fraai exemplaar op de lamp te Montfort (MAASSEN).

Minstens even opvallend zijn vangsten van imagines in januari en februari. De volgende kunnen vermeld worden: 3.I.1948, een overwinterend exemplaar in huis te Hilversum (CARON); 12.I.1948 een vlinder gekweekt uit een half december te Zeist gevonden rups (BROUWER); 17.I.1949, een vers exemplaar te Nuenen (NEIJTS); 24.I.1949 een vlinder te Leeuwarden (VAN MINNEN); 27.I.1949, een vers dier buiten te Naaldwijk (MEURER); op dezelfde datum een vlinder te Stein

(Pater MUNSTERS); 1.II.1949 weer een exemplaar te Stein; 7.I.1950 een vlinder bij -4° C buiten te Amsterdam (VAN OORSCHOT); 22.II.1959 een vlinder in huis te Amsterdam (ENGEL). Op al deze gegevens aansluitend zijn enerzijds een aantal waarnemingen in november, anderzijds in maart en april.

Interessant is een eikweek in de open lucht van PEERDEMAN in 1961. De rupsen groeiden zeer onregelmatig op. Verpoppingsrijpe rupsen gingen dood bij vorst, maar de niet volwassen rupsen en de poppen doorstonden de lage temperatuur zonder enige schade. Ik ken geen enkele andere inlandse soort, die in staat is in zoveel verschillende stadia te overwinteren. Overigens blijft het een feit, dat *meticulosa* nooit zo talrijk is als in het najaar.

Variabiliteit. f. *suffusa* Warren, 1911. De bekende vorm met roodachtige voorvleugels blijft zeldzaam, maar is wel vrij geregeld in een enkel exemplaar onder de soort aan te treffen. Van enige samenhang met warme of koude zomers, zoals BALFOUR meende opgemerkt te hebben, is ook na 1943 niets gebleken. We weten dan ook nog niets over de factor of factoren, waaraan de vorm zijn ontstaan te danken heeft. Nieuwe vindplaatsen (zonder opgave van de collecties) zijn: Raalte, Wiessel, Apeldoorn, Slijk-Ewijk, Amersfoort, Zeist, Zaandam, Middelie, Heemskerk, Aerdenhout, Rotterdam, Oostvoorne, Melissant, Burgh, Westenschouwen, Valkenisse, Bergeijk, Eindhoven, Stein, Neercanne, Sint Pietersberg, Epen, Vaals. Ook wat minder extreme overgangsexemplaren komen voor.

f. *viridescens* Lempke, 1943. Exemplaren met zuiver groene voorvleugels zonder spoor van rood of rose zijn veel zeldzamer. Nieuwe vindplaatsen: Apeldoorn (LEFFEF, in Zoöl. Mus.); Amersfoort (NIEUWLAND); Slijk-Ewijk (VAN DE POL).

f. *flavescens* Saundby, 1963, *Ent. Rec.* 75: 85. Sterk verbleekt. De grondkleur van de voorvleugels licht geelachtig wit, de tekening licht geelachtig groen, achtervleugels eveneens lichter dan normaal; lichaam dezelfde lichte kleur als de voorvleugels. Plaat 11 fig. 5. Amsterdam, ♂, 20.IX.1902 (Leids Mus.).

f. *fumosa* Cockayne, 1951, *Ent. Rec.* 63: 160, plaat 5 fig. 3. Voorvleugels en thorax verdonkerd. Bij het holotype waren de achtervleugels normaal van kleur, maar de naam kan naar mijn mening gebruikt worden voor alle opvallend verdonkerde exemplaren, waarbij ook de achtervleugels hun gewone lichte kleur missen. Apeldoorn (LEFFEF, in Zoöl. Mus.); Berg en Dal (BOLDT); Zeist (GORTER); Amsterdam, Katwoude (WITMOND); Middelie (DE BOER).

f. *reducta* Lempke, 1943. Exemplaren, waarbij het donkere middenveld de binnenrand van de voorvleugels niet bereikt, zijn blijkbaar vrij zeldzaam. Nieuwe vindplaatsen: Glimmen, Lelystad, Slijk-Ewijk (VAN DE POL); Eindhoven (VAN DULM).

f. *trapezina* Lempke, 1943. Ook dieren met opvallend verbreed middenveld waar dit de binnenrand raakt, komen weinig voor. Nieuwe vindplaats: Voerendaal (Zoöl. Mus.).

f. *westi* Chalmers-Hunt, 1961, *Entomologist* 94: 282, pl. VII fig. 9. Op de voorvleugels loopt de antemediane lijn van de voorrand min of meer verticaal omlaag tot dicht bij de binnenrand, buigt dan buitenwaarts en loopt vrijwel horizontaal even boven de binnenrand om daarna weer omhoog te gaan in de richting van de voorrand. In het subapicale gebied ligt franjewaarts van de lijn een lichte vlek. Zie plaat 11 fig. 6. Amersfoort (NIEUWLAND).

f. *minor* Cabeau, 1925. Dwergen werden nog bekend van Slijk-Ewijk (VAN DE POL); Den Haag (Zoöl. Mus.); Oostkapelle (VAN AARTSEN); Nuenen (NEIJTS); Epen (VAN WISSELINGH).

Teratologisch exemplaar. Rechter achtervleugel ontbreekt. Zeist (GORTER).

Callopistria Hübner

Callopistria juventina Cramer. *Tijdschr. Entom.* 95: 279; Cat. XI: (890). De vangst te Aerdenhout in 1951 is een unicum gebleven in het westen van Nederland. Daarentegen is de vlinder sinds 1952 op verschillende plaatsen in het zuiden en midden van Limburg gevangen, bij voorkeur in bosachtig terrein. Waarschijnlijk is er een samenhang tussen deze vondsten en die in België. Of *juventina* in dit deel van ons land steeds is aan te treffen, is op het ogenblik nog moeilijk uit te maken. De aantallen zijn in de regel zeer klein.

Ook uit het omringende gebied zijn nieuwe vondsten bekend geworden, die voor een deel toch wel doen denken aan recente pogingen tot gebiedsuitbreiding. In de omgeving van Hamburg werd in 1954 een exemplaar te Beimoor (ten oosten van de stad) aangetroffen (*Bombus* 1: 354, 1954). In België werd de soort voor het eerst vermeld van Baudour (in Henegouwen, ten noordwesten van Bergen), waar in 1941 een rups gevonden werd (*Lambillionea* 44: 10, 1944). In 1949 werd de vlinder vermeld van Strijtem (in Brabant, ten westen van Brussel) (*Lambillionea* 49: 17 en 107). In 1955 werd een vlinder te Brussel tegen een muur gevonden (op. cit. 58: 72, 1958). Tenslotte werd in 1963 een exemplaar te Warsage (prov. Luik) gevangen (op. cit. 63: 22, 1964). Ook in Engeland is *juventina* een paar maal gesignaleerd. Het eerste exemplaar werd in 1959 in de Leighton Woods (Sussex) gevonden (*Ent. Gazette* 11: 3, 1960). Het tweede werd in 1962 te Wye (Kent) aangetroffen (*Proc. Trans. South London ent. nat. Hist. Soc.* 1962: 45, pl. 1 fig. 7, 1963).

De Nederlandse vangsten liggen tussen eind juli en de tweede helft van augustus (30.VII—19.VIII).

Vindplaatsen. Lbg.: Swalmen, 9.VIII.1952 (PIJPERS, nu in Mus. Rotterdam); Geulem, in 1954 en 1955 tussen 4.VIII en 19.VIII samen zeven stuks (HARDONK; hiervan vier mannetjes en een ♀ in Zoöl. Mus.); Valkenburg, 6.VIII.1963 (HUISENGA); Gronsveld, juli 1961 (LEFFEF, in Zoöl. Mus.); Epen, 5.VIII.1954 en 30.VII.1956 (VAN WISSELINGH).

Ipimorpha Hübner

Ipimorpha retusa L. *Tijdschr. Entom.* 85: 87; Cat. VII: (414). Hoewel de vlinder over een groot deel van het land verbreid is, is hij op vele vindplaatsen toch vrij schaars, vooral op drogere gronden. In vochtiger terreinen kan hij echter soms tamelijk gewoon zijn. In het waddendistrict is *retusa* nu bekend van Schiermonnikoog en Terschelling.

De vliegtijd kan tot in oktober duren. De uiterste data worden nu: 4.VII—10.X. De laatste datum werd in 1962 door VAN AARTSEN genoteerd (na 2.X door BOGAARD, die in hetzelfde jaar te Hendrik-Ido-Ambacht een exemplaar ving).

Vindplaatsen. Fr.: Terschelling (in klein aantal, TANIS), Sexbierum, Sint Anna Parochie, Leeuwarden, Tietjerk, Eernewoude, Hieslum, Oosterwolde, Nijetrijne, Oude Mirdum, Dedgum, Tjerkwerd. Dr.: Donderen, Norg, Eelde, Peize, Schoonlo, Wijster, Havelte. Ov.: Denekamp, Volthe, Albergen, Almelo, Saasveld, Holten, Raalte, Abdij Sion, Platvoet, Vollenhove, Marknesse. Gdl.: Wiessel, Hoog-Soeren, Assel, Hoog-Buurlo, Uchelen, Empe, Laag-Soeren, Hoenderlo, Otterlo, Wageningen, Bennekom, Lunteren; Zutfen, Eefde, Almen, de Velhorst, Korenburgerveen, Doetinchem, Hoog-Keppel, Babberich, Loerbeek; Slijk-Ewijk. Utr.: Utrecht, Vreeland. N.H.: 's-Graveland, Kortenhoef, Bussum, Naardermeer, Weesp, Amsterdamse Bos (gewoon, PEERDEMAN), Halfweg, Landsmeer, Zaandam, Middelie, Oosthuizen, Hoorn, Schoorl, Egmond aan Zee, Castricum, Heemskerk, Bloemendaal, Aerdenhout, Heemstede. Z.H.: Woerdense Verlaat, Leiden, Oegstgeest, Delft, Wateringen, Staelduin, Vlaardingen, Capelle aan den IJssel, Schelluinen, Gorkum, Arkel, Hendrik-Ido-Ambacht (van 1956—1960 gewoon, daarna veel zeldzamer, BOGAARD), Oostvoorne, Hellevoetsluis, Middelharnis, Melissant, Ouddorp. Zl.: Burgh, Haamstede, Westenschouwen, Oostkapelle, Valkenisse, Cadzand. N.B.: Ulvenhout, Biesbosch, Waalwijk, Drunen, Haaren, Eindhoven, Schaft, Someren, Gassel, Sint Anthonis, Helenaveen. Lbg.: Sevenum, Grubbenvorst, Tegelen, Steijl, Heel, Stein, Heerlerbaan, Voerendaal, Heer, Gronsveld, Rijckholt, Slenaken, Vijlen, Lemiers, Vaals.

Variabiliteit. f. *grisea* Lempke, 1943. Enkele exemplaren met donkergrijze voorvleugels werden nog aangetroffen te: Volthe (VAN DER MEULEN); Denekamp, Kortenhoef, Serooskerke, Brabantse Biesbosch, Gronsveld (Zoöl. Mus.); Heemskerk (WESTERNENG); Epen (VAN WISSELINGH).

f. *gracilis* Haworth, 1809. De vorm met roodachtige voorvleugels is niet zeldzaam.

f. **obscura** nov. Grondkleur van voor- en achtervleugels sterk verdonkerd, zwartachtig. Volthe, Almelo (VAN DER MEULEN); Vreeland, Epen (VAN WISSELINGH); Amsterdamse Bos (PEERDEMAN); Serooskerke-Walcheren (holotype, ♀, 1.VIII.1938, Zoöl. Mus.).

[Ground colour of the fore and hind wings strongly darkened, blackish.]

f. **submarginata** nov. Bovenzijde voorvleugels: de gewaterde band is duidelijk lichter dan de grondkleur. Vreeland, ♀, 27.VII.1941 (holotype, VAN WISSELINGH).

[Upper side fore wings: the area between postmedian and submarginal line is distinctly paler than the ground colour.]

f. *nictitans* Lempke, 1943. Exemplaren met scherpe lichte tekening werden nog bekend van: Schiermonnikoog (VAN WISSELINGH); Denekamp (Zoöl. Mus.); Apeldoorn (LEFFEF, in Zoöl. Mus.).

f. **obsoleta** nov. Voorvleugels met zeer zwakke nauwelijks zichtbare tekening. Sloten-N.H. (♀, juli 1880, holotype), Weesp, Zoutelande, Breda (Zoöl. Mus.); Wassenaar (VAN WISSELINGH).

[Fore wings with obsolete markings.]

Ipimorpha subtusa Schiff. *Tijdschr. Entom.* 85: 86; Cat. VII: (413). De vlinder is het minst verbreid in het Hafdistrict en in het noordoosten van het land. Daarentegen zijn in het Fluviatiel District belangrijk meer vindplaatsen bekend dan van de vorige soort. Het zuidoosten van het land blijft echter het deel met de

sterkste verbreiding. Hier zullen maar weinig plaatsen zijn, waar de soort niet is aan te treffen. In het Waddendistrict is *subtusa* tot nog toe alleen bekend geworden van Terschelling, dat trouwens het best doorzochte waddeneiland is.

De vliegtijd kan tot in de tweede helft van september duren. De uiterste data worden nu: 27.VI—19.IX.

Vindplaatsen. Fr.: Terschelling, Sexbierum, Leeuwarden, Tietjerk, Eernewoude, Oosterwolde, Nijetrijne, Nije Mirdum, Oude Mirdum (weinig, Leffef), Tjerkwerd. Gr.: Glimmen, Borgercompagnie. Dr.: Roden, Donderen, Schoonlo (gewoon, Leffef), Wijster. Ov.: Volthe, Almelo, Hengelo, Raalte, Holten, Abdij Sion, Deventer, Vollenhove, Marknesse. Gdl.: Garderbroek, Wiessel, Teuge, Hoenderlo, Otterlo, Renkum, Bennekom, Lunteren; Gorssel, Eefde, Neede, Winterswijk, Woold, Hoog-Keppel, Babberich, Loerbeek; Slijk-Ewijk, Buren, Ingen, Geldermalsen. Utr.: Odijk, Utrecht, Amersfoort. N.H.: 's-Graveland, Kortenhoef, Bussum, Naarden, Naardermeer, Weesp, Amsterdam, Amsterdamse Bos (gewoon, Peerdeman), Zaandam, Beemster, Oosthuizen, Hoorn, Schoorl, Bergen, Castricum, Heemskerk, Bloemendaal, Aerdenhout. Z.H.: Meijendel, Voorschoten, Delft, Vlaardingen, Schelluinen, Hendrik-Ido-Ambacht (van 1956—1960 zeldzaam, daarna gewoon, meer dan *retusa*, Bogaard), Oostvoorne, Hellevoetsluis, Melissant. Zl.: Burgh, Haamstede, Westenschouwen, Oostkapelle, Valkenisse, Goes, Cadzand. N.B.: Waalwijk, Drunen, Haaren, Sint Michielsgestel, Kampina, Nuenen, Eindhoven, Someren, Helenaveen, Gassel. Lbg.: Horst, Grubbenvorst, Swalmen, Merum, Sint Odiliënberg, Herkenbosch, Montfort, Stein, Brunssum, Heerlerbaan, Wijlre, Bunde, Heer, Cannerbos, Gronsveld, Slenaken, Vijlen, Lemiers, Vaals.

Variabiliteit. f. *rufescens* Lempke, 1943. Exemplaren met roodachtige voorvleugels werden verder bekend van: Amsterdam (Zoöl. Mus.); Aerdenhout (van Wisselingh).

f. *grisea* Lempke, 1943. Exemplaren met zuiver donkergrijze voorvleugels werden aangetroffen te: Apeldoorn, Oisterwijk, Gronsveld (Zoöl. Mus.); Aerdenhout (van Wisselingh).

f. **obscura** nov. Grondkleur van de voorvleugels zwartachtig bruin. Oosthuizen, ♂, 8.VIII.1954 (holotype, de Boer).

[Ground colour of the fore wings blackish brown.]

f. **bicolor** nov. Wortelveld en achterrandsveld van de voorvleugels donker, middenveld licht afstekend. Hendrik-Ido-Ambacht, ♀, 11.VII.1958 (holotype, Bogaard).

[Basal and outer areas of the fore wings dark, central area contrasting through a distinctly paler ground colour.]

f. *rufolineata* Lempke, 1943. Nieuwe vindplaatsen van exemplaren met roodachtige dwarslijnen en omranding van de vlekken: Marknesse (van de Pol); Amsterdamse Bos (Peerdeman); Rotterdam (Zoöl. Mus.); Schelluinen (Lucas).

f. **conjuncta** nov. De ronde vlek raakt de tapvlek. Apeldoorn (holotype, de Vos).

[The orbicular touches the claviform.]

Dwergen. Twello (Coldeweij); Kortenhoef (Zoöl. Mus.); Montfort (Maassen); Stein (Missiehuis); Epen (van Wisselingh).

Enargia Hübner

Enargia paleacea Esper. *Tijdschr. Entom.* 85: 80; Cat. VII: (407). Heel duidelijk weer een soort, die zijn areaal in de loop van deze eeuw in ons land sterk uitgebreid heeft. Aan het einde van de 19de eeuw waren slechts drie vindplaatsen bekend: Nederhorst den Berg, Breda en de Sint Pietersberg. In 1943 kon ik daar 10 nieuwe aan toevoegen. Thans, ruim 20 jaar later, volgt een lijst van weer 65 nieuwe vindplaatsen, terwijl de vlinder op verscheidene van de reeds vermelde na 1943 herhaaldelijk aangetroffen is. Dat hij nog steeds bezig is zijn gebied uit te breiden, blijkt uit vangsten in het Hafdistrict en het Fluviatiel District, biotopen, die volkomen van zijn normale vindplaatsen afwijken. Deze vangsten zullen dan ook merendeels wel zwervers betreffen. Natuurlijk moeten we de moderne vangmethoden door een veel groter aantal verzamelaars dan vroeger niet uit het oog verliezen. Maar daar de vlinder volgens de ervaring van Leffef nog veel beter op stroop dan op licht komt (wat hij overigens ook voortreffelijk doet), had de vorige generatie van verzamelaars hem zeker niet gemist als hij er werkelijk geweest was.

Het voornaamste biotoop wordt gevormd door bosachtige gebieden op drogere gronden, wat wel duidelijk blijkt uit het voorkomen op de Veluwe. Uit het omringende gebied zijn mij slechts enkele nieuwe gegevens bekend geworden. In Denemarken heeft de vlinder zich in Jutland uitgebreid. Zie Hoffmeyer, De Danske Ugler, 2de druk: 278, 1962. Uit het omringende Duitse gebied zag ik alleen een vermelding van Rheidt in de voormalige Rijnprovincie (Künnert, 1957, *Ent. Z. Frankfurt* 67: 152), maar gezien onze ervaring in Limburg moet *paleacea* ook hier gewoner geworden zijn. In België zijn uitsluitend enkele nieuwe vindplaatsen in het oosten van het land bekend geworden. De heer De Laever gaf mij de volgende op: Seraing (Luik), Hotton, Han-sur-Lesse, Virton (alle in de prov. Luxemburg) en Membre s. Semois (Namen). In Groot-Brittannië is het areaal wel iets uitgebreid, maar niet in die mate als bij ons. Uit Schotland zijn nu ook enkele vindplaatsen bekend. Zie South, Moths Brit. Isles, nieuwe editie 1: 327 (1961).

De vliegtijd kan al eind juni beginnen en voortduren tot in oktober. De uiterste data worden nu: 23.VI—7.X. De vroegste datum werd in 1959 door Pater Munsters waargenomen te Stein (29.VI.1947 te Bennekom, van de Pol, 30.VI.1959 te Hoenderlo, Leffef). De laatste datum werd in 1962 door Leffef te Westenschouwen genoteerd.

Vindplaatsen. Fr.: Sexbierum (1964, Stobbe). Dr.: Roden, Eext, Schoonlo. Ov.: Volthe, Saasveld, Abdij Sion, Colmschate. Gdl.: Wiessel, Hoog-Soeren, Assel, Teuge, Uchelen, Imbosch, Hoenderlo, Otterlo (gewoon), Lunteren; Gorssel, Almen, Ruurlo, Neede, Korenburgerveen, Winterswijk; Slijk-Ewijk, Neerijnen. Utr.: Rhenen, Amerongen, Zeist, Bilthoven. N.H.: Bussum, Halfweg (1964, van Aartsen), Oosthuizen (1956, de Boer), Schoorl, Overveen. Z.H.: Schelluinen (1964, Slob), Dordrecht (1964, kapelaan Groenendijk), Oostvoorne, Hellevoetsluis. Zl.: Burgh, Haamstede (bij het kasteel, gewoon, Leffef), Westenschouwen, Oostkapelle. N.B.: Boxtel, Bergeijk, Nuenen, Helenaveen (vrij gewoon, Leffef). Lbg.: Geijsteren, Sevenum, Castenray, Venlo, Tegelen, Swalmen, Roggel, Maalbroek, Vlodrop, Posterholt, Montfort, Stein, Simpelveld, Bunde, Heer, Rijckholt, Gronsveld, (Epen, reeds bekend, in sommige jaren vrij talrijk, bijv. 25 in 1954, van Wisselingh), Vijlen, Lemiers.

Variabiliteit. Nu het Zoöl. Mus. over een flinke serie beschikt, is het duidelijk, dat de typische vorm verreweg het meest hier te lande voorkomt.

f. *angulago* Haworth, 1809. De vorm met diep oranjegele voorvleugels is waarschijnlijk wel overal onder de soort aan te treffen, maar is veel schaarser.

f. **pallida** nov. Grondkleur van de voorvleugels bleekgeel. Twello, Otterlo, Geulem (Zoöl. Mus.).

Holotype: ♂ van Otterlo, 22.VIII.1960, in genoemde collectie.

[Ground colour of the fore wings pale yellow.]

f. **suffusa** nov. Voorvleugels sterk verdonkerd door een min of meer dichte bestuiving van zwarte schubben. Hoenderlo, Otterlo, Halfweg, Gronsveld (Zoöl. Mus.); Epen, ♀ (VAN WISSELINGH).

Holotype: ♂ van Halfweg, 14.VIII.1964 (VAN AARTSEN leg., in Zoöl. Mus.).

[Fore wings strongly darkened through a more or less strong suffusion with black scales.]

f. **obsoleta** nov. Tekening van de voorvleugels zeer zwak. Apeldoorn, Helenaveen (LEFFEF, in Zoöl. Mus.); Otterlo, Sint Pieter (Zoöl. Mus.); Epen, Vaals (VAN WISSELINGH).

Holotype: ♀ van Sint Pieter, 15.VII, in Zoöl. Mus.

[Markings of the fore wings obsolete.]

f. **juncta** nov. Ronde vlek en niervlek raken elkaar. Apeldoorn, ♀, 26.VII. 1953 (holotype, Zoöl. Mus.).

[Orbicular and reniform touch each other.]

f. **semiconfluens** nov. Ronde vlek en niervlek smal met elkaar verbonden. Apeldoorn, ♀, 22.VIII.1956 (holotype, LEFFEF, in Zoöl. Mus.); Otterlo (Zoöl. Mus.); Ruurlo (LUKKIEN); Epen (VAN WISSELINGH).

[Orbicular and reniform connected by a narrow isthmus.]

f. **confluens** nov. Ronde vlek en niervlek samengesmolten tot één enkele vlek. Epen, ♂, 21.VIII.1954 (holotype, VAN WISSELINGH).

[Orbicular and reniform completely fused.]

Dwergen. Apeldoorn, Otterlo, Geulem (Zoöl. Mus.); Zeist (GORTER).

Enargia ypsillon Schiff. *Tijdschr. Entom.* 90: 83; Cat. VIII: (493). De in 1949 gegeven verbreiding is wel juist. Toch valt het aantal nieuwe vindplaatsen vooral in het oosten van het land niet mee, een aanwijzing, dat de vlinder niet overal tot de gewone soorten behoort. In het Hafdistrict en in het zuiden van het land is hij daarentegen goed verbreid. In het Waddendistrict is *ypsillon* nu bekend van Texel, Vlieland en Terschelling (hier niet zeldzaam, TANIS).

De vlinder kan al begin juni verschijnen. De uiterste data worden nu: 1.VI—8.VIII. De vroegste datum werd in 1947 te Stein waargenomen door Pater MUNSTERS (3.VI.1954 te Marknesse, VAN DE POL).

Vindplaatsen. Fr.: Terschelling, Vlieland, Sexbierum, Leeuwarden, Tietjerk, Nijetrijne, Friens, Oude Mirdum, Tjerkwerd. Dr.: Peize, Donderen, Norg, Zuidlaren, Schoonlo, Hooghalen. Ov.: Volthe, Bornerbroek, Raalte, Abdij Sion, Colmschate, Marknesse. Gdl.: Voorthuizen, Garderbroek, Wiessel, Hoog-Soeren, Teuge, Uchelen, Hoenderlo, Bennekom, Ederveen, Lunteren; Eefde, Ruurlo, De Velhorst, Babberich; Ooy, Slijk-Ewijk. N.H.: Naarden, Naardermeer, Weesp, Amsterdamse Bos, Beemster, Oosthuizen, Hoorn, Nek, Schoorl, Bergen, Bakkum, Heemskerk, Overveen, Aerdenhout. Z.H.: Woerdense Verlaat, Noorden, Leiden, Oegstgeest, Den Haag, Vlaardingen, Capelle aan den IJssel, Schelluinen, Arkel, Dubbeldam, Hendrik-Ido-Ambacht, Hellevoetsluis, Ouddorp. Zl.: Burgh, Haamstede, Westenschouwen, Oostkapelle, Valkenisse, Goes, Cadzand. N.B.: Hilvarenbeek, Helvoirt, Sint Michielsgestel, Haaren, Kampina, Nuenen, Eindhoven, Schaft, Someren, Deurne, Sint Anthonis. Lbg.: Sevenum, Velden, De Hamert, Herten, Linne, Montfort, Stein, Schinveld, Brunssum, Heerlerbaan, Bocholtz, Eijs, Wijlre, Heer, Gronsveld, Vijlen, Lemiers.

Variabiliteit. f. *cinerea* Heinrich, 1923. De vorm met lichtgrijze normaal getekende voorvleugels werd nog aangetroffen te: Weesp, Voerendaal (Zoöl. Mus.); Nuenen (NEIJTS); Geulem, Epen (VAN WISSELINGH).

f. *obscura* Favre, 1897. Overal zeer gewoon, vooral bij het ♀.

f. *corticea* Esper, [1788]. Exemplaren met roodbruine grondkleur van de voorvleugels blijven zeldzaamheden. Nieuwe vindplaatsen: Aalten (VAN GALEN); Heemstede (VON HERWARTH); Nuenen (NEIJTS).

f. *nigrescens* Tutt, 1892. Ook de vorm met zwartachtige voorvleugels komt nog weinig voor. Nieuwe vindplaatsen: Vorden, Noorden, Oegstgeest (LUCAS); Oosthuizen (DE BOER); Aerdenhout, Heemstede (VAN WISSELINGH).

f. *obsolescens* Lenz, 1927. De vorm met zeer zwak getekende voorvleugels is vrij gewoon.

f. *juncta* Lempke, 1949. Overal gewoon onder de soort.

f. *semiconfluens* Lempke, 1949. Vrij gewoon, eveneens haast overal onder de soort aan te treffen.

f. *confluens* Lempke, 1949. Deze extremere vorm daarentegen blijft een zeldzaamheid. Ik ken geen nieuwe vindplaatsen.

Dwergen. Lunteren (BRANGER); Aerdenhout (VAN WISSELINGH).

Dicycla Guenée

Dicycla oo L. *Tijdschr. Entom.* 85: 80; Cat. VII: (407). Het is nu wel duidelijk, dat deze soort hier te lande niet inheems is. We kennen slechts vangsten uit de jaren 1869, 1872, 1877 en 1940 (en de nog oudere niet gedateerde waarneming te Empe). Wel is de vlinder in een deel van de vorige eeuw hier blijkbaar een iets minder zeldzame gast geweest dan hij later geworden is. Overigens blijft de vangst van maar liefst tien stuks te Borne in 1940 wel heel merkwaardig (enkele van deze exemplaren bevinden zich nu in Zoöl. Mus.).

Ook uit het omringende gebied is weinig nieuws te melden. In Denemarken heeft men dezelfde ervaring als bij ons. In de vorige eeuw is de vlinder plaatselijk gewoon geweest, maar uit de 20ste eeuw zijn slechts enkele vangsten bekend van 1900, 1910 en 1938 (HOFFMEYER, De Danske Ugler, 2de druk, p. 276—277, 1962). In het noordwesten van Duitsland is geen enkele nieuwe waarneming gemeld. Uit België werd slechts één nieuwe vangst bekend: Saint Mard (bij Virton, prov. Luxemburg) in 1963 (*Linn. Belg.* 2: 127, 1964).

Cosmia Ochsenheimer

Subgenus Cosmia Ochsenheimer

Cosmia (Cosmia) affinis L. *Tijdschr. Entom.* 85: 85; Cat. VII: (412). Niettegenstaande het vrij grote aantal vindplaatsen is de vlinder toch tamelijk lokaal, althans nu, wat waarschijnlijk wel zal samenangen met de veel geringere aanplant van de voornaamste voedselplant, de iep. Toch kan het dier ook nu nog op plaatsen, waar de boomsoort in voldoende mate aanwezig is, vrij gewoon zijn. In het Waddendistrict bekend van Terschelling en Schiermonnikoog.

De vliegtijd kan tot in de derde decade van september duren. De uiterste data worden nu: 20.VI—24.IX. De laatste datum werd in 1956 te Stein waargenomen (Pater MUNSTERS).

Vindplaatsen. Fr.: Terschelling (niet gewoon, TANIS), Sexbierum, Tietjerk, Friens, Oude Mirdum, Tjerkwerd. Dr.: Schoonlo. Gdl.: Ermelo, Nunspeet, Wiessel, Apeldoorn, Teuge, Laag-Soeren; Hoog-Keppel; Slijk-Ewijk. Utr.: Grebbe, Vreeland. N.H.: Bussum, Weesp, Middelie, Beemster, Oosthuizen, Hoorn, Groet, Bergen, Velzen, Santpoort, Bentveld, Aerdenhout, Heemstede. Z.H.: Arkel, Hellevoetsluis, Melissant, Goedereede, Ouddorp. Zl.: Burgh, Haamstede, Westenschouwen, Oostkapelle, Valkenisse, Cadzand. N.B.: Uden, Helenaveen. Lbg.: Sevenum, Montfort, Stein, Amstenrade, Heerlen, Chèvremont, Eijs, Geulem, Bunde, Heer, Cannerbos, Gronsveld, Mheer, Vijlen.

Variabiliteit. Of de typische vorm met roodachtige voorvleugels nu nog de hoofdvorm is, is zeer de vraag. Plaatselijk althans zeker niet. Bij de flinke serie van Walcheren van VAN AARTSEN bevond zich maar een enkel exemplaar. De meeste dieren waren donker tot zeer donker.

f. *suffusa* Tutt, 1892. De vorm met donkergrijze, soms iets groen getinte voorvleugels is thans gewoon en kan plaatselijk zelfs overheersen.

f. *obsoleta-suffusa* Tutt, 1892. Een variant van de vorige vorm, waarbij de witte vlekjes aan de voorrand van de voorvleugels vrijwel verdwenen zijn, is veel zeldzamer. Nieuwe vindplaatsen: Weesp, Den Haag, Gronsveld (Zoöl. Mus.); Middelie (DE BOER); Epen (VAN WISSELINGH).

f. *ochrea* Tutt, 1892. De vorm met licht okerachtig bruine voorvleugels is evenmin gewoon. Nieuwe vindplaatsen: Vreeland (Zoöl. Mus.); Vogelenzang (VAN WISSELINGH); Stein (VAN DE POL).

f. *obsoleta-ochrea* Tutt, 1892. De variant van de vorige vorm met nauwelijks aanwezige witte vlekjes aan de voorrand van de voorvleugels werd nog aangetroffen te: Bolsward (Zoöl. Mus.); Gronsveld (LEFFEF, in Zoöl. Mus.).

f. *obsoleta* Lempke, 1943. De vorm met typische roodachtige voorvleugels, waarop de witte voorrandsvlekjes vrijwel geheel ontbreken, werd nog bekend van: Paterswolde, Haarlem, Wassenaar (VAN WISSELINGH); Slijk-Ewijk, Heemstede (VAN DE POL); Stein (Missiehuis); Geulem, Gronsveld (Zoöl. Mus.); Cannerbos (LUCAS).

f. *affinella* Strand, 1915. De mooie vorm met opvallend grote witte voorrandsvlekken is vooral in de lichtere vormen vrij verbreid.

f. *nigrimaculata* Warren, 1911. De vorm met extra zwarte tekening op de voorvleugels is zeldzaam. Nieuwe vindplaatsen: Heer (VAN DE POL); Mechelen (VAN WISSELINGH).

f. *bredemanni* Warnecke, 1933, *Entom. Anzeiger* 13: 95. Voorvleugels normaal getekend en gekleurd (dus variërend van typisch tot *suffusa*), maar achtervleugels eenkleurig zwart met gele franje, naar de wortel iets lichter. Plaat 11 fig. 12. Tjerkwerd (MULDER); Slijk-Ewijk, Heemstede (VAN DE POL); Weesp (Zoöl. Mus.); Middelie (DE BOER); Schoorl (AUKEMA); Groet, Burgh (PEERDEMAN); Aerdenhout, Epen (VAN WISSELINGH); Den Haag (Leids Mus.); Oostkapelle (VAN AARTSEN); Mheer (TER LAAG). Blijkbaar al een vrij verbreide vorm.

f. *nigrata* Schawerda, 1927, *Verh. zool.-bot. Ges. Wien* 77: (82). Voorvleugels even zwart als de achtervleugels, maar de tekening is nog te zien. Ook deze extreem melanistische vorm is uit ons land bekend: Ouderkerk, ♂, 1960 (LOURENS); Mheer, ♂, 1958 (TER LAAG).

Dwergen. Gronsveld (LEFFEF, in Zoöl. Mus.); Eijs (VAN DE POL).

Cosmia (Cosmia) diffinis L. *Tijdschr. Entom.* 85: 84; Cat. VII: (411). Sinds 1943 zijn alleen enkele vangsten in het zuiden van Limburg bekend geworden, zodat hier blijkbaar de tegenwoordige uiterste grens van het areaal in het westen van het continent ligt. Dit verklaart ook de zeldzaamheid hier te lande. Nieuwe gegevens uit het omringende gebied zijn mij niet bekend geworden.

De vliegtijd kan al in de eerste helft van juli beginnen. De uiterste data worden nu: 10.VII—12.VIII.

Vindplaatsen. Lbg.: Stein, 30.VII.1929, 5.VIII en 10.VIII.1958, 10.VII.1959, 30.VII.1960 en 26.VII.1964 (collectie Missiehuis); Geulem, 4.VIII.1954 (HARDONK, nu in Zoöl. Mus.).

Variabiliteit. f. **pallescens** nov. Bovenzijde voorvleugels: wortelveld normaal van kleur behalve een smalle streep langs de binnenrand, de rest licht roodbruin behalve een smalle band van de normale kleur langs de voorrand tot aan de golflijn; achtervleugels en lichaam normaal van kleur. Plaat 11 fig. 13. Geulem, ♂, 4.VIII.1954 (holotype, HARDONK leg., in Zoöl. Mus.).

[Upper side fore wings: basal area of the normal colour except a narrow stripe along the inner margin, the rest pale red-brown except a narrow band of the normal colour along the costa as far as the submarginal line; hind wings and body of normal colour.]

Subgenus Calymnia Hübner

Cosmia (Calymnia) pyralina Schiff. *Tijdschr. Entom.* 85: 83; Cat. VII: (410). Hoewel de vlinder inderdaad vooral in bosachtige gebieden voorkomt, zijn toch ook een flink aantal vindplaatsen in het Hafdistrict en het Fluviatiel District bekend geworden, zodat we wel mogen aannemen, dat *pyralina* ook hier een echte indigeen is. In het Waddendistrict is het dier echter nog niet waargenomen.

Slechts een zeer kleine correctie op de vliegtijd, waarvan de uiterste data nu worden: 23.VI—14.VIII.

Vindplaatsen. Fr.: Terschelling (vrij gewoon, LEFFEF), Sexbierum, Leeuwarden, Tietjerk, Friens, Beetsterzwaag, Oosterwolde, Oude Mirdum. Gr.: Veendam, Vlagtwedde. Dr.: Peize, Roden, Zuidlaren, Eext, Schoonlo (talrijk, LEFFEF), Odoorn, Wijster. Ov.: Denekamp, Volthe, Albergen, Saasveld, Wiene, Nijverdal, Raalte, Abdij Sion, Diepenveen, Platvoet, Vollenhove. Gdl.: Ermelo, Leuvenum, Uddel, Tongeren, Heerde, Wiessel, Hoog-Soeren,

Assel, Teuge, Uchelen, Empe, Laag-Soeren, Hoenderlo, Lunteren; Zutfen, Eefde, Warnsveld, de Voorst, Ruurlo, Woold; Slijk-Ewijk, Heteren, Ingen, Geldermalsen. Utr.: Leusden, Amersfoort, Maarsseveen. N.H.: 's-Graveland, Hilversum, Ouderkerk, Amsterdamse Bos (zeldzaam, PEERDEMAN), Beemster, Hoorn, Bergen, Heemskerk, Bloemendaal, Overveen, Aerdenhout, Heemstede. Z.H.: Noordwijkerhout, Oegstgeest, Leiden, Wassenaar, Staelduin, Schelluinen, Arkel, Hendrik-Ido-Ambacht (weinig, BOGAARD), Hellevoetsluis, Melissant. Zl.: Burgh, Haamstede, Oostkapelle, Valkenisse. N.B.: Bergen op Zoom, Ulvenhout, Udenhout, Nieuwkuik, Sint Michielsgestel, Haaren, Kampina, Vessem, Someren, Helenaveen, Gassel. Lbg.: de Hamert, Velden, Sevenum, Swalmen, Sint Odiliënberg, Montfort, Stein, Sittard, Amstenrade, Bocholtz, Eijs, Wijlre, Aalbeek, Geulem, Bunde, Heer, Cannerbos, Gronsveld, Mheer, Mechelen, Vijlen, Lemiers, Vaals.

Variabiliteit. f. *arnoi* Schawerda, 1924. De vorm met lichte, rosebruine voorvleugels is vrij zeldzaam. Afgevlogen exemplaren, die oorspronkelijk de normale purperachtig bruine grondkleur hadden, kunnen er sterk op gaan lijken. Nieuwe vindplaatsen: Almelo (VAN DER MEULEN); Eext, Colmschate, Tongeren, Apeldoorn (Zoöl. Mus.); Valkenisse (VAN AARTSEN); Epen (VAN WISSELINGH).

f. *obscura* Hoffmann, 1914, *Mitt. naturw. Ver. Steiermark* 50: 141. Grondkleur van de voorvleugels zwartbruin (en ook de achtervleugels sterk verdonkerd). Plaat 11 fig. 14. Eext (Zoöl. Mus.); Platvoet, ♂, 1946 (LUKKIEN); Ratum (PEERDEMAN); Slijk-Ewijk, Eijs (VAN DE POL); Aerdenhout (VAN WISSELINGH); Oostvoorne (LUCAS); Montfort (MAASSEN); Gronsveld (VAN AARTSEN). De vorm verbreidt zich blijkbaar al vrij sterk onder de soort.

f. **nigra** nov. Voorvleugels eenkleurig zwartachtig, achtervleugels eveneens sterk verdonkerd. Winterswijk, ♂, 26.VII.1956 (holotype), Eijs (VAN DE POL).

[Fore wings unicolorous blackish, hind wings also strongly darkened.]

f. *saturatebrunnea* Strand, 1915, *Arch. Naturgesch.* 81 A(11): 164. Kop, thorax en vleugels bruiner. Blijkbaar worden hiermee exemplaren bedoeld, die de roodachtige tint in de grondkleur missen. Maarsseveen, een dier met grijsachtig bruine voorvleugels (DE NIJS).

f. **dealbata** nov. De witte vlekjes aan de voorrand van de voorvleugels ontbreken volkomen, overigens normaal. Ermelo, ♂, 1958, Saasveld, ♀, 1959 (VAN DER MEULEN); Zeist (GORTER); Epen, ♂, 17.VII.1956 (holotype, plus twee andere mannetjes van dezelfde vindplaats in 1952 en 1955, VAN WISSELINGH).

[The white spots on the costa of the fore wings fail completely, for the rest normal.]

Dwergen. Zuidlaren, Doetinchem (Zoöl. Mus.); Zeist (GORTER).

Teratologisch exemplaar. ♀ met onontwikkeld abdomen, dat slechts drie mm lang is. Hatert (VAN WISSELINGH).

Cosmia (Calymnia) trapezina L. *Tijdschr. Entom.* 85: 81; Cat. VII: (408). De vlinder komt in allerlei biotopen voor. LEFFEF merkt op: „Letterlijk overal, maar toch het meest in eiken-berkenbosgebieden. Komt beter op stroop dan op licht". Maar ook te Hendrik-Ido-Ambacht is *trapezina* gewoon (BOGAARD). In het Waddendistrict nu bekend van Texel (de Koog, FISCHER), Vlieland, Terschelling (gewoon, LEFFEF, TANIS) en Schiermonnikoog.

De vliegtijd kan al in de tweede helft van juni beginnen en nog iets langer duren

dan in 1943 bekend was. De uiterste data worden nu: 22.VI (in 1943 te Rotterdam, LUCAS) tot 5.X (in 1954 te Heemstede, VAN DE POL).

V a r i a b i l i t e i t. De gewoonste vorm is de typische, waartoe alle exemplaren met lichte duidelijk getekende voorvleugels gerekend moeten worden, al zit ook in deze groep nog vrij veel variatie.

f. *pallida* Tutt, 1892. De exemplaren met lichte onduidelijk getekende voorvleugels zijn bij de wijfjes gewoon, bij de mannetjes komen ze veel minder voor.

f. *ochrea* Tutt, 1892. Exemplaren met helder geelachtige duidelijk getekende voorvleugels zijn gewoon, maar komen bij het ♂ minder voor dan bij het ♀.

f. *obsoleta-ochrea* Tutt, 1892. Dezelfde kleurvorm, maar met onduidelijk getekende voorvleugels is bij het ♀ niet zeldzaam, maar komt bij het ♂ weinig voor (in Zoöl. Mus. slechts een paar exemplaren van Kollum, Apeldoorn, Warnsveld en Venlo).

f. *carnea* Warren, 1911. Exemplaren met lichte voorvleugels, maar waarbij alle donkerdere partijen en vooral de middenschaduw mooi roodachtig van tint zijn, zijn zeker niet gewoon. Geen nieuwe vindplaatsen.

f. *rufo-pallida* Tutt, 1892. Exemplaren met lichte voorvleugels, maar waarbij het hele middenveld roodachtig is, zijn daarentegen niet zeldzaam, maar komen bij het ♂ meer voor dan bij het ♀.

f. *aurantia* Lempke, 1943. Exemplaren, waarbij de voorvleugels een oranje grondkleur hebben, blijven vrij zeldzaam. Nieuwe vindplaatsen: Noordlaren, Bennekom (VAN DE POL); Otterlo, de Voorst (Zoöl. Mus.); Montfort (MAASSEN); Epen (VAN WISSELINGH).

f. *rufa* Tutt, 1892. Exemplaren met roodachtige duidelijk getekende voorvleugels zijn gewoon en komen bij ♂ en ♀ ongeveer even talrijk voor. Verscheidene exemplaren van deze kleurgroep hebben zeer donkere achtervleugels, die op de lichte voorrand en de franje na soms bijna zwart zijn.

f. *obsoleta-rufa* Tutt, 1892. Dezelfde kleurvorm, maar met zwak getekende voorvleugels, is beslist zeldzaam, wat wel duidelijk blijkt uit het feit, dat de collectie van het Zoöl. Mus. slechts één ♂ en twee wijfjes bevat. Nieuwe vindplaatsen: Oosterbeek, Soest, Bussum (Zoöl. Mus.); Steijl (Br. ANTHONIUS).

f. *conspersa* Warren, 1911. Exemplaren met roodachtige voorvleugels, die sterk donker bestoven zijn, komen bij het ♂ niet zeldzaam voor, maar zijn bij het ♀ veel zeldzamer (in het Zoöl. Mus. slechts twee stuks van Apeldoorn en Otterlo).

f. *ochrea-conspersa* Lempke, 1943. Exemplaren met geelachtige sterk met zwarte schubben bestoven voorvleugels zijn niet zeldzaam en komen bij ♂ en ♀ ongeveer even veel voor.

f. *grisea* Tutt, 1892. Exemplaren met grijsachtige sterk donker bestoven voorvleugels zijn bij het ♂ gewoon, maar komen bij het ♀ weinig voor (in het Zoöl. Mus. slechts vier stuks van Apeldoorn, Twello, Lochem en Hollandse Rading).

f. **brunnea** nov. Grondkleur van de voorvleugels bruin, zonder rode of gele tint. Valkenisse (CARON); Epen, ♂, 10.VIII.1958 (holotype, VAN WISSELINGH).

[Ground colour of the fore wings brown, without red or yellow tint.]

f. **obscura** nov. Voorvleugels zwartgrijs, achtervleugels iets lichter. Hoenderlo, ♂, 4.VIII.1961 (holotype), Assel, 1963 (VAN AARTSEN, in Zoöl. Mus.).

[Fore wings black-grey, hind wings a little paler.]

f. **sagittata** nov. Bovenzijde voorvleugels: aan de binnenkant van de golflijn een rij scherp afstekende zwarte wigvormige vlekken. Groenekan (Leids Mus.); Zeist (GORTER); Valkenisse, ♀, 18.VII.1959 (holotype, VAN AARTSEN, in Zoöl. Mus.).

[Upper side fore wings: on the inner side of the submarginal line a row of strongly contrasting black sagittate spots.]

f. **clausa** nov. De eerste en de tweede dwarslijn raken elkaar aan de binnenrand van de voorvleugels. Slijk-Ewijk, ♂, 10.VII.1961 (holotype, VAN DE POL).

[The antemedian and the postmedian touch each other on the inner margin of the fore wings.]

f. *fasciata* Erschoff, 1882. De vorm met lichte voorvleugels en een geheel gevulde scherp afstekende donkerbruine middenband blijft zeldzaam. Een prachtig exemplaar is afgebeeld op plaat 11 fig. 4. Nieuwe vindplaatsen: Saasveld (Molenven), 1958 (VAN DER MEULEN); Zeist, 1959, 1963 (GORTER); Heemstede, 1954 (VAN DE POL); Stein, 1958 (Missiehuis); Brunssum, 1959 (CLAASSENS).

f. *lutescens* Wehrli, 1917. Exemplaren met eenkleurig geelachtige achtervleugels zijn vrij zeldzaam. Nieuwe vindplaatsen: Zeist (GORTER); Hilversum, Bussum (Zoöl. Mus.); Haarlem (VAN DER MEULEN); Wassenaar (VAN WISSELINGH); Aarle-Rixtel (PEERDEMAN); Stein (Missiehuis); Lemiers (DELNOYE).

f. **postnigrescens** nov. Gehele achtervleugel zwartachtig op de lichte franje na; de lichte rand langs de costa ontbreekt dus. Stein, ♂, 25.VII.1927 (holotype, Missiehuis).

[The whole hind wing blackish with the exception of the fringes; the pale band along the costa fails.]

Dwergen. Blijkbaar niet al te zeldzaam. Nunspeet, Apeldoorn, Velzen (Zoöl. Mus.); Bussum (TER LAAG); Heemskerk (BANK); Wassenaar (VAN WISSELINGH).

Hyppa Duponchel

Hyppa rectilinea Esper. *Tijdschr. Entom.* 85: 125; Cat. VII: (452). Het meest komt de vlinder voor in het centrale gedeelte van de Veluwe, in bosgebieden met ondergroei van bosbessen. Plaatselijk is hij soms gewoon op smeer (LEFFEF, in 1954 80 op één avond!). Daarnaast is een enkele nieuwe vindplaats in Utrecht bekend geworden in precies hetzelfde biotoop, terwijl ook Limburg een paar nieuwe gegevens heeft opgeleverd.

De vliegtijd kan tot in de tweede helft van juli duren. De uiterste data worden nu: 16.V—23.VII. De laatste datum stamt uit 1946, Steijl, Br. ANTHONIUS.

Vindplaatsen. Gdl.: Speulderholt (bij Putten), Garderen, Elspeet, Uddel, Epe, Gortel, Nierssen, Wiessel, Kootwijkerveen, Kootwijk, Hoog-Soeren, Assel, Uchelen, Spelderholt, Hoenderlo, Dabbelo, Imbosch. Utr.: Austerlitz (1953, GORTER). Lbg.: Steijl (1946, Br. ANTHONIUS), Cannerbos (1952, Leids Mus.).

Variabiliteit. f. *semivirgata* Tutt, 1892. Nog een enkel exemplaar werd aangetroffen, waarbij alleen de onderhelft van de middenband van de voorvleugels verdonkerd is: Apeldoorn (LEFFEF, in Zoöl. Mus.).

f. **fuscomarginata** nov. Bovenzijde voorvleugels: het achterrandsveld vrijwel even donker als het middenveld, maar het wortelveld blijft licht bruingrijs. Apeldoorn, ♂, 19.VI.1958 (holotype, LEFFEF, in Zoöl. Mus.); Assel (VAN AARTSEN, in Zoöl. Mus.).

[Upper side fore wings; the postdiscal area almost as dark as the central area, but the basal area remains pale brown-grey.]

f. **postmarginata** nov. Achtervleugels met brede donkere scherp afstekende achterrandsband. Kootwijkerveen, ♀, 1.VI.1958 (holotype, LEFFEF, in Zoöl. Mus.); Apeldoorn (VAN AARTSEN, in Zoöl. Mus.).

[Hind wings with broad dark sharply contrasting band along the hind margin.]

f. *juncta* Lempke, 1943. Een exemplaar met elkaar rakende vlekken werd nog bekend van Wiessel (LEFFEF, in Zoöl. Mus.).

f. *semiconfluens* Lempke, 1943. Een exemplaar met smal verbonden vlekken van Breda, 1882 (Leids Mus.).

Actinotia Hübner

Actinotia polyodon L. *Tijdschr. Entom.* 82: 252; Cat. IV: (259). In verband met de voedselplant van de rups (*Hypericum*, hertshooi) liggen vrijwel alle vindplaatsen op de zandgronden en in het Krijtdistrict. Daarbuiten zijn slechts enkele vangsten bekend geworden, die zeer waarschijnlijk vondsten aan spoorbanen of zwervers betreffen. Op de meeste vindplaatsen is de vlinder vrij schaars of zelfs zeldzaam. Alleen in het Duindistrict is *polyodon* plaatselijk soms tamelijk gewoon.

In de drie noordelijke provincies en op de waddeneilanden is de soort nog steeds niet aangetroffen. Een deel van de noordwestgrens van het areaal loopt blijkbaar door ons land. In dit verband kan ook gewezen worden op de grote zeldzaamheid van de vlinder op de Britse eilanden. Hier is hij alleen zeer sporadisch in de zuidelijke helft van Engeland waargenomen, terwijl slechts één twijfelachtige vermelding van Ierland bekend is.

De eerste generatie kan al in april beginnen te vliegen. De uiterste data ervan worden nu: 30.IV (in 1954 te Swalmen, LÜCKER) tot 24.VI. Die van de tweede generatie blijven: 11.VII—29.VIII. Heel zelden komt blijkbaar een partiële derde generatie voor. In 1948 ving DELNOYE nog op 17 oktober een exemplaar te Vaals.

Vindplaatsen. Ov.: Volthe, Almelo, Abdij Sion. Gdl.: Wageningen, Bennekom; Eefde, de Voorst, Lochem, Aalten, Terborg, Babberich. N.H.: Hilversum, Halfweg (één exemplaar in 1959, VAN AARTSEN), Heemskerk, Aerdenhout, Heemstede. Z.H.: Leiden (1954, LUCAS), Wassenaar. Lbg.: Sevenum, Swalmen, Heel, Sint Odiliënberg, Montfort, Stein, Chèvremont, Simpelveld, Bocholtz, Geulem, Bunde, Cannerbos, Gronsveld, Rijckholt, Cadier, Vaals.

Variabiliteit. Afgezien van kleine tintverschillen in de grondkleur van de voorvleugels is niets van variatie te bespeuren.

Apamea Ochsenheimer

Apamea monoglypha Hufnagel. *Tijdschr. Entom.* 90: 62; Cat. VIII: (472). Aan de in 1949 aangegeven verbreiding is niets nieuws toe te voegen. Reeds toen was de vlinder van alle waddeneilanden met uitzondering van Rottum bekend en dat is tot nog toe zo gebleven. Van de vangsten met de Rivon-lampen op Schouwen merkt LEFFEF op: „Te Burgh en Haamstede astronomische aantallen. Blijkbaar een ideaal milieu voor de soort hier".

De vliegtijd kan al eind mei beginnen en nog tot in oktober voortduren. Op 15.X.1953 ving GORTER nog een ♂ te Zeist. Of dit een exemplaar van een dan wel zeer exceptionele tweede generatie is (die zelfs uit het zuiden van Europa niet bekend is), dan wel een verlaat dier van de normale enige generatie, is moeilijk uit te maken. Voorlopig lijkt me het laatste wel het waarschijnlijkste. De uiterste data zijn nu: 31.V (in 1964 te Stein, Pater MUNSTERS) tot 15.X.

Variabiliteit. f. *pallida* Lempke, 1949. Een mooi exemplaar met zeer lichte grondkleur van Gronsveld (PEERDEMAN).

f. *grisea* Lempke, 1949. Exemplaren met donkergrijze grondkleur werden nog bekend van Zuidlaren (BOUWSEMA), Middelie (DE BOER) en Westenschouwen (LEFFEF, in Zoöl. Mus.).

f. *pallida-fasciata* Lempke, 1949. Een exemplaar met witachtige gewaterde band werd te Apeldoorn gevangen (LEFFEF, in Zoöl. Mus.).

f. *contraria* Lempke, 1940. De vorm met donkerbruine grondkleur, maar met grote lichte vlek aan de binnenrandshoek van de voorvleugels, is niet zeldzaam. Nieuwe vindplaatsen: Apeldoorn (LUCAS); Winterswijk (OORD); Valkenisse (VAN AARTSEN); Waalwijk (DIDDEN); Swalmen (PIJPERS); Brunssum (GIELKENS); Chèvremont (LUKKIEN); Meerssen (RIJK).

f. **fuscomarginata** nov. Bovenzijde voorvleugels: grondkleur normaal, maar het achterrandsveld donkerbruin, scherp afstekend. Harderwijk, ♂, 15.VI.1960 (holotype, HARSEVOORD).

[Upper side fore wings: ground colour normal, but the area between postdiscal line and hind margin dark brown, sharply contrasting.]

f. *intacta* Petersen, 1903. Zeer gewoon.

f. *uniformata* Weymer, 1878. Eveneens gewoon.

f. *benesignata* Lempke, 1949. De vorm met donkerbruine voorvleugels, waarop de drie lichte dwarslijnen scherp afsteken, is zeldzaam. Nieuwe vindplaatsen: Glimmen (VAN DE POL); Delfzijl, Wassenaar (VAN WISSELINGH); Twello (Zoöl. Mus.); Zeist (GORTER); Vierhouten, Apeldoorn, Oostvoorne (LUCAS); Deurne (NIES); Chèvremont (LUKKIEN).

f. *brunnea* Tutt, 1889. De vorm met donkerbruine onduidelijk getekende voorvleugels is slechts van enkele nieuwe vindplaatsen bekend geworden: Doetinchem, Renkum, Woerdense Verlaat (Zoöl. Mus.); Wassenaar (VAN WISSELINGH).

f. *infuscata* White, 1871. De vorm met zwartbruine, duidelijk getekende voorvleugels komt door het gehele land onder de soort voor, al blijven het altijd opvallende dieren. Zowel bij deze als bij de volgende vorm schijnen de wijfjes te overheersen.

f. *obscura* Thierry Mieg, 1886. Ook hetzelfde kleurtype, maar met onduidelijk getekende voorvleugels, is op alle vindplaatsen aan te treffen.

f. *rosea* Schönfeld, 1917. Dit moet wel een rariteit zijn. Ik heb er geen enkel nieuw exemplaar van gezien.

f. *juncta* Lempke, 1949. Nieuwe vindplaatsen: Delfzijl (VAN WISSELINGH); Bennekom (VAN DE POL).

f. *semiconfluens* Lempke, 1949. Nieuwe vindplaatsen: Slijk-Ewijk (VAN DE POL); Bilthoven (Zoöl. Mus.); Zaandam (AUKEMA); Woerdense Verlaat (VAN AARTSEN, in Zoöl. Mus.); Leiden (Leids Mus.).

f. **obsoleta** nov. Voorvleugels licht bruinachtig grijs, tekening zeer onduidelijk. Plaat 12 fig. 1. Amsterdam, ♂, 8.VII.1932 (holotype, VAN DER MEULEN).

[Fore wings pale brownish grey, markings obsolete.]

f. **tangens** nov. Bovenzijde voorvleugels: de twee dwarslijnen raken elkaar boven de binnenrand en lopen dan weer uit elkaar. Den Haag, ♂, 4.VII.1938 (HARDONK, in Zoöl. Mus.); Vierhouten (LUCAS).

[Upper side fore wings: the antemedian and the postmedian touch each other above the inner margin, then separate again.]

Dwergen. Oosterend-Terschelling (LUCAS); Nije Mirdum (MULDER); Odoorn (PEERDEMAN); Colmschate, Leuvenum, Ubbergen (Zoöl. Mus.); Zeist (GORTER); Schelluinen (SLOB).

Apamea lithoxylaea Schiff. *Tijdschr. Entom.* 90: 61; Cat. VIII: (471). Sinds 1949 zijn verschillende vindplaatsen in het Hafdistrict bekend geworden. Merkwaardig is dat de vlinder sterk in het Fluviatiel District verbreid blijkt te zijn. Ook in het noorden van het land is hij nu aangetroffen en hij is tenminste van één van de waddeneilanden bekend geworden. Hoewel de soort dus in een groot deel van ons land blijkt voor te komen, is hij echter zelden op de vindplaatsen werkelijk gewoon.

Geen correctie op de vliegtijd, die dus blijft: 4.VI—25.VIII.

V i n d p l a a t s e n. Fr.: Terschelling (één exemplaar in 1956 te West-Terschelling, LEFFEF). Gr.: Groningen. Dr.: Schoonlo. Ov.: Deventer, Platvoet, Zwartsluis. Gdl.: Ermelo, Heerde, Wiessel, Hoog-Soeren, Assel, Teuge, Uchelen, Hoenderlo, Kootwijkerveen; Almen, Winterswijk, Loerbeek, Aerdt; Slijk-Ewijk, Buren, Geldermalsen, Neerijnen. Utr.: Leersum, Zeist, Soesterberg, Vreeland. N.H.: 's-Graveland, Weesp, Amsterdamse Bos, Halfweg, Zaandam, Beemster, Oosthuizen, Schoorl, Heemskerk, Aerdenhout, Heemstede. Z.H.: Leiden, Wassenaar, Voorschoten, Delft, Staelduin, Vlaardingen, Rotterdam (ook Kralingerhout), Capelle aan den IJssel, Schelluinen, Gorkum, Arkel, Dubbeldam, Zwartewaal. Zl.: Burgh, Westenschouwen, Valkenisse, Krabbendijke, Cadzand. N.B.: Sint Michielsgestel, Haaren, Oisterwijk, Kampina, Bergeijk, Geldrop, Someren, Nuenen, Sint Anthonis, Boxmeer. Lbg.: Sevenum, Kelpen, Swalmen, Melick, Herkenbosch, Montfort, Stein, Amstenrade, Hoensbroek, Heerlen, Chèvremont, Huls, Simpelveld, Wijlre, Geulem, Heer, Gronsveld, Vijlen, Lemiers, Vaals.

V a r i a b i l i t e i t. Zoals reeds in 1949 werd opgemerkt, is deze zeer gering.

f. **cinerascens** nov. Grondkleur van de voorvleugels lichtgrijs, dus donkerder dan bij de typische vorm, achtervleugels met donkerder band langs de achterrand.

Epen, ♀, 4.VII.1964 (holotype), plus enkele mannetjes en wijfjes van dezelfde vindplaats uit 1963 en 1964 (VAN WISSELINGH).

[Ground colour of the fore wings pale grey, darker than with the typical form, hind wings with darker band along the outer border.]

Dwergen. Wiessel (LEFFEF, in Zoöl. Mus.); Cadzand (PEERDEMAN).

Apamea sublustris Esper. *Tijdschr. Entom.* 90: 61; Cat. VIII: (471). Het duingebied is in ons land ongetwijfeld het beste milieu voor de soort. Het is het enige biotoop, waar *sublustris* werkelijk gewoon kan zijn. Zo geeft VAN WISSELINGH voor Aerdenhout op: steeds talrijk. En LEFFEF vermeldt, dat de Rivon-lamp, die in 1964 te Overveen brandde, een groot aantal exemplaren opleverde, terwijl hij de vlinder in 1956 ook talrijk te West-Terschelling aantrof. In het binnenland is *sublustris* vooral verbreid (maar lang niet zo gewoon) in het zuiden en midden van Limburg, terwijl hij dan verder in het oosten van het land lokaal en zeldzaam wordt aangetroffen. Hij is nu ook van één van de waddeneilanden bekend.

De vliegtijd kan al eind mei beginnen (30.V.1959, LUCAS, 31.V.1950, VAN WISSELINGH, 31.V.1956, VAN DE POL) en tot in de tweede helft van augustus duren (17.VIII.1955, Leiden, LUCAS). Daardoor valt hij dus vrijwel samen met die van de vorige soort.

V i n d p l a a t s e n. Fr.: Terschelling. Gr.: Groningen. Ov.: Platvoet. N.H.: Schoorl, Egmond aan Zee, Bakkum, Limmen, Beverwijk, Heemstede, Vogelenzang. Z.H.: Meijendel, Voorschoten, Loosduinen, Staelduin, Hendrik-Ido-Ambacht, Oostvoorne, Rockanje, Hellevoetsluis, Melissant, Goedereede, Ouddorp. Zl.: Burgh, Haamstede, Westenschouwen, Oostkapelle, Cadzand. Lbg.: Sevenum, Swalmen, Simpelveld, Bocholtz, Maastricht, Heer, Gronsveld, Savelsbos, Cottessen, Vijlen.

V a r i a b i l i t e i t. De door ESPER afgebeelde vlinder (plaat 133 fig. 1), heeft inderdaad vrij donkere voorvleugels, al moeten we wel rekening houden met de tamelijk primitieve platen in zijn werk. De tekst zegt ook al niet zoveel, omdat ESPER blijkens zijn afbeeldingen *sublustris* en *lythoxylaea* als dezelfde soort beschouwde (vandaar dat hij de vlinder nogal variabel vond). Toch is de figuur van het holotype beslist donkerder dan wat wij hier in de regel vangen, zodat het correct is alleen exemplaren met duidelijk donkerder grondkleur als typisch te beschouwen. Zulke dieren zijn vrij zeldzaam bij ons. Nieuwe vindplaatsen: Egmond, Heemskerk, Vogelenzang (Zoöl. Mus.); Meijendel, Oostvoorne (LUCAS).

De grote meerderheid hoort tot de lichtere f. *intermedia* Tutt.

f. *pallida* Tutt, 1889. Deze lichte vorm is blijkbaar niet al te zeldzaam. Nieuwe vindplaatsen zijn: Deventer, Egmond, Heemskerk, Zandvoort, Wassenaar, Den Haag (Zoöl. Mus.); Aerdenhout (VAN WISSELINGH); Meijendel, Oostvoorne (LUCAS).

f. *versicolor* Lempke, 1949. Exemplaren met roodbruine donkere tekening zijn veel zeldzamer. Nieuwe vindplaatsen: Doetinchem (Zoöl. Mus.); Meijendel, Oostvoorne (LUCAS).

f. **obsoleta** nov. De donkere tekening op de voorvleugels veel lichter, nauwelijks afstekend. Plaat 15 fig. 4. Aerdenhout, ♂, 9.VII.1955 (holotype, VAN WISSE-

LINGH); Overveen (LEFFEF, in Zoöl. Mus.); Heemstede (VAN DE POL).

[The dark markings on the fore wings much paler, hardly contrasting.]

Apamea crenata Hufnagel. *Tijdschr. Entom.* 90: 67; Cat. VIII: (477). Hoewel de vlinder inderdaad het meest op de zandgronden voorkomt, zijn de laatste jaren tal van vindplaatsen in het Hafdistrict en het Fluviatiel District bekend geworden, die moeilijk alle aan zwervers toegeschreven kunnen worden. In het eerstgenoemde district zijn dit: Sexbierum, Marknesse, Kalenberg, Zwartsluis, Oosthuizen, de Beemster, Halfweg, het Amsterdamse Bos, in het laatstgenoemde district: Aerdt, Slijk-Ewijk, Heteren, Ochten, Asperen, Arkel (hier in 1964 gewoon, ZWAKHALS), Schelluinen.

In het Waddendistrict is *crenata* nu ook aangetroffen op Vlieland, zodat alleen Ameland en Rottum nog ontbreken in de eilandenreeks.

In vroege jaren kan de vlinder al in april verschijnen, zoals blijkt uit de vangst van een exemplaar op 20.IV.1961 in het Amsterdamse Bos door PEERDEMAN. Dit is echter een grote uitzondering. De daarop volgende datum is 7.V (in 1960 te Oostvoorne door LUCAS).

Variabiliteit. f. *pallida* Heinrich, 1916. Deze zeer lichte vorm werd nog aangetroffen te Borgercompagnie (WITMOND), Apeldoorn, Hilversum (Zoöl. Mus.), Montfort (MAASSEN).

f. *putris* Hübner, [1800—1803], Samml. Europ. Schmetterl., Noct., fig. 241. Grondkleur van de voorvleugels geelachtig bruin, middenveld en franjeveld donkerder bruin, dwarslijnen volledig, duidelijk zichtbaar, evenals de ronde vlek en de niervlek. Westervelde (BLOM); Hooghalen (VAN DER MEULEN); Burgh (PEERDEMAN).

f. *subrurea* Petersen, 1902. Enkele nieuwe vindplaatsen: Haren-Gr. (VAN NIEDEK), Zuidlaren (BOGAARD), Eext (Zoöl. Mus.); Bennekom (VAN DE POL).

f. **grisescens** nov. Voorvleugels eenkleurig grijsbruin, ronde vlek en niervlek licht, duidelijk. Valkenisse, ♀, 12.VI.1963 (holotype, VAN AARTSEN, in Zoöl. Mus.).

[Fore wings unicolorous grey-brown, orbicular and reniform pale, distinct.]

f. *nigro-rubida* Tutt, 1889. Deze zwartachtig rode vorm, de donkerste die op het ogenblik bekend is, komt op tal van plaatsen onder de soort voor, maar bij het ♀ opvallend meer dan bij het ♂.

f. *juncta* Lempke, 1949. Nieuwe vindplaatsen: Delfzijl, Aerdenhout (VAN WISSELINGH); Veenhuizen (Zoöl. Mus.); Leiden, Oostvoorne (LUCAS).

f. **semiconfluens** nov. Ronde vlek en niervlek smal met elkaar verbonden. Wijster, ♀, 6.VII.1938 (holotype), Groenekan (Leids Mus.).

[Orbicular and reniform connected by a narrow isthmus.]

Dwergen. Eext, Deurne (Zoöl. Mus.).

Apamea epomidion Haworth, 1809 (*Noctua characterea* Hübner, [1800—1803], nec Schiff., 1775). *Tijdschr. Entom.* 90: 66; Cat. VIII: (476). Sinds de publicatie van Cat. VIII in 1949 is slechts één nieuwe Nederlandse vangst bekend

geworden, ook weer in het zuiden van Limburg. Alles wijst er dan ook op, dat de vlinder slechts een enkele maal in staat is zijn areaal tot in dit gebied uit te breiden, maar dat hij zich hier niet duurzaam kan handhaven.

In het omringende gebied is *epomidion* nu ook bij Hamburg aangetroffen. In 1954 werd te Beimoor ten oosten van de stad een exemplaar gevangen (*Bombus* 1: 353, 1954). Uit België werden vangsten bekend te Buzenol in 1961 (*Linn. Belg.* 1: 126) en te Argenteau (*Lambillionea* 63: 22, 1964).

De uiterste data van de weinige Nederlandse vangsten worden nu: 18.VI—11.VII.

Vindplaats. Lbg.: Kasteel Neercanne, ♀, 11.VII.1959 (BLOM).

Variabiliteit. Van de vorm, die nu de typische vorm geworden is, is alleen het exemplaar van Houthem bekend uit de collectie-DE VOS.

f. *lipara* Tams, 1961, in SOUTH, Moths Brit. Isles, new ed., 1: 277, pl. 92 fig. 5. Dit is de nu geldige naam voor de bruinere bontere vorm, die voorheen als typisch werd beschouwd en die in „SOUTH" uitstekend afgebeeld is. Zij komt blijkbaar het meest voor. Ook het exemplaar van 1959 hoort er weer toe.

Apamea aquila funerea von Heinemann. *Tijdschr. Entom.* 90: 65; Cat. VIII: (475). Binnen het in 1949 aangegeven territorium zijn nog een aantal nieuwe vindplaatsen bekend geworden. Plaatselijk, zoals in het noorden van Drente en in de Peel, kan de vlinder zeer talrijk zijn. Hij komt echter veel beter op stroop dan op licht.

De vliegtijd kan tot eind augustus duren. De grenzen worden nu: 3.VII—31.VIII. De laatste datum werd in 1962 door LEFFEF genoteerd in de Peel.

Vindplaatsen. Fr.: Fochtelo, Oosterwolde. Dr.: Peize, Roden, Norg, Donderen, Zuidlaren, Grollo, Dwingelo, Havelte. Ov.: Saasveld (Molenven). Gdl.: Uddel, juli 1914 (CARON, uit collectie-MACHERY). N.B.: Helenaveen. Lbg.: Griendsveen.

Apamea lateritia Hufnagel. *Tijdschr. Entom.* 90: 64; Cat. VIII: (474). Algemeen verbreid op de zandgronden in de oostelijke helft van het land. Slechts enkele vindplaatsen in het Wadden-, Haf-, Fluviatiel- en Duindistrict, die voor het grootste deel de indruk maken op zwervers betrekking te hebben.

De vliegtijd kan tot eind augustus duren. De uiterste data worden nu: 15.VI—31.VIII. De laatste datum werd in 1956 door LUCAS genoteerd.

Vindplaatsen. Fr.: Terschelling (in 1956 enkele exemplaren te West-Terschelling, LEFFEF), Leeuwarden, Beetsterzwaag, Duurswoude, Fochtelo, Nijetrijne. Gr.: Noordlaren, Veendam, Vlagtwedde. Dr.: Peize, Roden, Steenbergen, Donderen, Vries, Zuidlaren, Eext, Grollo, Schoonlo, Odoorn, Odoornerveen, Wijster, Dwingelo, Havelte. Ov.: Volthe, Vasse, Albergen, Saasveld, Markelo, Raalte, Abdij Sion, Tjoene, Frieswijk, Platvoet, Steenwijkerwold, Marknesse. Gdl.: Garderbroek, Ermelo, Hulshorst, Vierhouten, Wezep, Wiessel, Hoog-Soeren, Assel, Uchelen, Leesten, Hoenderlo, Otterlo, Harskamp, Kootwijkerveen, Wageningen, Lunteren; Gorssel, Almen, de Velhorst, Ruurlo, Woold, Loerbeek; Slijk-Ewijk. Utr.: Amersfoort, Soestduinen, Nieuw-Loosdrecht, Utrecht. N.H.: 's-Graveland, Blaricum, Huizen, Amsterdamse Bos (en de reeds vermelde vindplaats Amsterdam, beide weinig, PEERDEMAN), Hoorn (één exemplaar in 1956, HOUTMAN). Z.H.: Den Haag, Hendrik-Ido-Ambacht (één exemplaar in 1959, BOGAARD). Zl.: Burgh (enkele exemplaren, LEFFEF), Cadzand (één exemplaar in 1963, PEERDEMAN). N.B.: Schijf, Teteringen, Oosterhout, Waalwijk, Drunen,

Goirle, Hilvarenbeek, Haaren, Sint Michielsgestel, Kampina, Moergestel, Oirschot, Best, Eindhoven, Vessem, Bergeijk, Geldrop, Someren, Helenaveen, Mill, Gassel. Lbg.: Griendsveen, Sevenum, Wellerlooi, de Hamert, Arcen, Lomm, Grubbenvorst, Belfeld, Swalmen, Maasniel, Sint Odiliënberg, Vlodrop, Montfort, Chèvremont, Eijs, Geulem, Cadier, Sint Pietersberg, Gronsveld, Vijlen.

Variabiliteit. f. *unicolor* Heinrich, 1916. Deze eenkleurige vorm is zeker niet gewoon. Nieuwe vindplaatsen: Oirschot (KNIPPENBERG); Eindhoven (VERHAAK).

f. *derufata* Warren, 1911. Ook deze vorm komt weinig voor. Nieuwe vindplaatsen: Hulshorst, Doorn (Zoöl. Mus.); Deurne (NIES); Chèvremont (LUKKIEN).

f. *grisescens* Lempke, 1949. Deze grijsachtige vorm is evenmin gewoon. Nieuwe vindplaatsen: Tongeren, Apeldoorn (Zoöl. Mus.); Hoog-Soeren (LUCAS).

f. *contraria* Heydemann, 1933. Slechts een enkele nieuwe vindplaats van deze bonte vorm: Gronsveld (VAN AARTSEN).

f. *borealis* Strand, 1903. Een vrij gewone donkere vorm, die op vele plaatsen onder de soort voorkomt.

f. *melania* Lambillion, 1903. De donkerste vorm van de soort en nog altijd zeldzaam. Nog bekend geworden van: Eext (Zoöl. Mus.); Wijster (LUCAS); Tjoene (LUKKIEN); Bergeijk (VAN WISSELINGH).

f. *albicingulata* Warnecke, 1931. Nieuwe vindplaatsen van de vorm met wit geringde vlekken zijn: Hoenderlo (LUCAS); Arnhem, Zeist, Hilversum, Deurne (Zoöl. Mus.); Apeldoorn (LEFFEF); 's-Graveland (Nat.hist. Mus. Zaandam); Someren (PEERDEMAN).

f. *obsoleta* Stephan, 1924. Deze vorm is weer veel zeldzamer. Nog bekend van: Harskamp (LUCAS); Bergeijk (VAN WISSELINGH).

Dwergen. Apeldoorn (Zoöl. Mus.); Zeist (GORTER).

Teratologisch exemplaar. Linker achtervleugel te klein. Winterswijk (VAN DE POL).

Apamea furva freyeri Boie. *Tijdschr. Entom.* 90: 73; Cat. VIII: (483). De vlinder komt zowel op droge zandgronden als op (de resten van) hoogvenen lokaal in het oosten en hier en daar in het zuiden van het land voor. Plaatselijk soms niet zeldzaam.

In België, waar de vlinder tot nog toe uitsluitend uit de Kempen bekend was, werd hij nu ook in de provincie Luxemburg gevonden (Emeilles bij Grand Han, 4.VI.1948, DE LAEVER, *Lambillionea* 49 : 43, 1949).

Ook bij ons kan *furva* reeds in juni verschijnen. In het Zoöl. Mus. bevindt zich een exemplaar van Nijverdal, dat helaas niet nauwkeuriger gedateerd is dan VI.1935. De laatste datum blijft 26.IX.

Vindplaatsen. Dr.: Peizerveen, Westervelde, Schoonlo, Dwingelo, Ruinen, Havelte. Ov.: Nijverdal. Gdl.: Ermelo, Assel, Uchelen, Otterlo, Harskamp. N.B.: Waalwijk, Aarle-Rixtel. Lbg.: Griendsveen, Sevenum.

Variabiliteit. Terwijl de vlinder geografisch vrij sterk varieert (zie de bespreking hiervan in 1949), is de variabiliteit binnen de populaties uiterst gering.

Dwerg. Ruinen (VIS c.s.).

Apamea oblonga Haworth, 1809 (*abjecta* Hübner, [1809—1813]). *Tijdschr. Entom.* 90: 70; Cat. VIII: (480). De in 1949 aangegeven verbreiding is juist met deze correctie, dat de vlinder in het westen van het land plaatselijk zeer gewoon kan zijn, vooral op de Zuidhollandse eilanden en in Zeeland.

De vliegtijd kan tot in de tweede helft van augustus duren. De uiterste data worden nu: 9.VI—22.VIII. De laatste datum werd in 1960 te Glimmen waargenomen (VAN DE POL).

Vindplaatsen. Fr.: Terschelling (West-Terschelling en de Boschplaat, TANIS), Sexbierum, Leeuwarden, Friens, Nijetrijne. Gr.: Glimmen. Dr.: Norg, Schoonlo. Ov.: Vollenhove, Giethoorn. Flevoland: Lelystad (tamelijk gewoon, VAN DE POL). Gdl.: Ermelo, Wiessel, Wageningen; Slijk-Ewijk. Utr.: Woudenberg, Zeist, Spakenburg, Breukelen. N.H.: Naarden, Amsterdamse Bos (geregeld in klein aantal, PEERDEMAN), Halfweg, Zaandam, Den Helder, Schoorl, Santpoort, Aerdenhout. Z.H.: Schelluinen, Gorkum, Spijk bij Arkel, Dubbeldam, Oostvoorne, Hellevoetsluis, (op de reeds vermelde vindplaats Melissant de gewoonste *Apamea*, schrijft HUISMAN!), Goedereede. Zl.: Burgh (in 1963 zeer talrijk, LEFFEF), Haamstede, Westenschouwen, Nieuwerkerk (Schouwen), Sloedam, Oostkapelle, Valkenisse, Cadzand. Lbg.: Griendsveen.

Variabiliteit. De typische vorm is de bonte, dezelfde, die later door STAUDINGER f. *variegata* werd genoemd. Deze vorm is zeldzaam, zoals wel blijkt uit de weinige bekende vindplaatsen, en ook daar steeds in een enkel exemplaar. Nieuw zijn de volgende: Lelystad (VAN DE POL); Zaandam (AUKEMA); Nieuwerkerk (LUCAS); Sloedam (VAN AARTSEN, in Zoöl. Mus.); Bergen op Zoom (KORRINGA).

f. *unicolor* Tutt, 1889. Deze vrijwel eenkleurige donkere vorm komt inderdaad bij ons het meest voor.

f. *nigro-distincta* Tutt, 1889. Deze donkere maar duidelijk getekende vorm is iets minder gewoon dan de vorige, maar is op alle vindplaatsen onder de soort aan te treffen.

Alle andere in 1949 vermelde vormen behalve de volgende moeten vervallen. Bij oudere exemplaren wordt de grondkleur vaak bruiner, maar verse dieren met zo een tint heb ik niet gezien.

f. *juncta* Lempke, 1949. Geen nieuwe vondsten.

f. *semiconfluens* Lucas, 1959, *Ent. Ber.* 19: 205. De ronde vlek en de niervlek smal met elkaar verbonden. Nieuwerkerk (LUCAS).

Dwerg. Lelystad (VAN DE POL).

Apamea remissa Hübner. *Tijdschr. Entom.* 90: 75; Cat. VIII: (485). Ook in het Hafdistrict is de vlinder plaatselijk geen zeldzaamheid. Nieuwe vindplaatsen in dit gebied zijn: Nijetrijne (gewoon, LEFFEF), Marknesse, Kalenberg, Halfweg, Zaandam, Woerdense Verlaat, Noorden, Leiden. Hij is nu ook bekend van Vlieland, zodat hij op Rottum na op alle waddeneilanden is aangetroffen.

De vliegtijd kan van half mei tot begin augustus duren. De uiterste data worden nu: 16.V—3.VIII. De vroegste datum werd in 1949 te Sint Michielsgestel waargenomen (KNIPPENBERG), de laatste in 1962 te Best (LEMPKE).

Variabiliteit. f. *obscura* Haworth, 1809. Deze donkere vorm is niet gewoon, maar is wel tamelijk verbreid onder de soort.

f. *supermissa* Spuler, 1905. Deze mooie extreem bonte vorm is evenmin talrijk, maar wordt ook vrijwel overal onder de soort aangetroffen.

f. **brunnea** nov. Grondkleur van de voorvleugels helder bruin, overigens tot de eenkleurige groep behorend. Bennekom, ♀, 21.VI.1939 (holotype, VAN DE POL).

[Ground colour of the fore wings clear brown, for the rest a representative of the unicolorous group.]

f. **protensa** nov. De ronde vlek wortelwaarts uitgerekt tot aan de eerste dwarslijn. Zeist, ♀, 21.VI.1951 (holotype, GORTER).

[The orbicular lengthened in the direction of the base and touching the antemedian.]

Dwergen. Blijkbaar niet al te zeldzaam. Eext, Apeldoorn, Twello, Den Haag, Valkenisse (Zoöl. Mus.); Lunteren (BRANGER); Amersfoort (NIEUWLAND); Zaandam (AUKEMA); Nuenen (NEIJTS).

Apamea unanimis Hübner. *Tijdschr. Entom.* 90: 69; Cat. VIII: (479). Vooral verbreid op vochtige terreinen, wat natuurlijk in verband staat met de voedselplant van de rups (Rietgras, *Phalaris*) en daardoor met vrij veel vindplaatsen in het Hafdistrict en het Fluviatiel District. Nu bekend van twee waddeneilanden.

Geen correctie op de vliegtijd, die dus blijft: 10.V—21.VII.

Vindplaatsen. Fr.: Terschelling, Vlieland, Sexbierum, Sint Anna Parochie, Leeuwarden, Tietjerk, Delleburen, Oosterwolde, Oldeberkoop, Wolvega, Nijetrijne (zeer talrijk, in 1963 bijv. op één avond 180 stuks op de lamp, LEFFEF), Oude Mirdum, Dedgum, Tjerkwerd. Dr.: Roden, Schoonlo. Ov.: Volthe, Almelo, Abdij Sion, Zwartsluis, Marknesse. Gdl.: Wapenveld, Wiessel, Hoog-Soeren, Teuge (talrijk, LEFFEF), Hoenderlo; Winterswijk, Didam, Aerdt; Ochten, Slijk-Ewijk, Geldermalsen, Neerijnen. Utr.: Amerongen, Cothen, Zeist, Utrecht, Amersfoort. N.H.: 's-Graveland, Weesp, Amsterdamse Bos (gewoon, PEERDEMAN), Halfweg (gewoon in 1964, VAN AARTSEN), Zaandam, Beemster, Oosthuizen, Hoorn, Schoorl, Bergen, Heemskerk, Aerdenhout. Z.H.: Woerdense Verlaat, Noorden, Duinrel, Den Haag, Delft, Arkel, Hendrik-Ido-Ambacht, Oud-Beierland, Brielle, Middelharnis, Melissant, Goedereede, Ouddorp. Zl.: Burgh, Haamstede, Westenschouwen, Oostkapelle, Goes, Cadzand. N.B.: Sint Michielsgestel, Oisterwijk, Best, Eindhoven, Nuenen, Helenaveen. Lbg.: Mook, Plasmolen, Arcen, de Hamert, Griendsveen, Tegelen, Belfeld, Voerendaal, Cadier, Cannerbos, Gronsveld, Vijlen, Lemiers.

Variabiliteit. f. *fasciata* Warren, 1911. Nieuwe vindplaatsen: Zeist (GORTER); Aerdenhout, Wassenaar (VAN WISSELINGH); Leiden (LUCAS).

f. *semiochrea* Warren, 1911. Niet gewoon. Nieuwe vindplaatsen: Apeldoorn (LEFFEF, in Zoöl. Mus.); Bussum, Kortenhoef, Voerendaal (Zoöl. Mus.); Halfweg (VAN AARTSEN, in Zoöl. Mus.); Middelie (DE BOER); Aerdenhout (VAN WISSELINGH).

f. *nigro-brunnea* Hoffmann, 1916. Deze donkere vorm is gewoon en is wel overal onder de soort aan te treffen. In 1964 ving VAN AARTSEN er een lange serie van te Halfweg (nu in Zoöl. Mus.).

f. *flavomaculata* Lempke, 1949. Kortenhoef (Zoöl. Mus.); Halfweg, Best (VAN AARTSEN, in Zoöl. Mus.); Wassenaar (VAN WISSELINGH).

Apamea illyria Freyer. Van deze soort zijn tot nog toe twee vangsten uit ons

land bekend, beide in het zuiden van Limburg. De eerste werd vermeld in *Ent. Ber.* 15: 119, 1954, waar het bewuste exemplaar ook afgebeeld werd.

In het omringende gebied is *illyria* aangetroffen in Denemarken, waar in 1962 twee stuks werden gevangen te Hostemark in Jutland (KAABER & NORGAARD, *Flora og Fauna* 69: 109, 1963). In het noordwesten van Duitsland is de soort alleen bekend van het bergachtige deel van Zuid-Hannover en wat de voormalige Rijnprovincie betreft, alleen in de Hunsrück. In België werd de vlinder voor het eerst in 1956 gevangen en wel in talrijke exemplaren te Grandmenil in het noorden van de provincie Luxemburg en vrijwel gelijktijdig te Han-sur-Lesse in de provincie Namen. In 1958 werd hij aangetroffen te Wavreille (ook in Namen, ten oosten van Han-sur-Lesse) en in 1960 bij Tailles op het plateau van de Baraque de Fraiture (in het noorden van de prov. Luxemburg ten zuidoosten van Grandmenil) (zie *Lambillionea* 57: 5, 59: 81 en 61: 18, waar bij vergissing als jaar van de eerste vangst 1958 wordt vermeld). Onze Nederlandse vangsten moeten uitlopers van dit nieuwe Oostbelgische areaal zijn. De vlinder is niet bekend van de Britse eilanden. De indruk is wel, dat *illyria* zijn areaal in noordelijke richting tracht uit te breiden (al is het resultaat in ons land niet bijster groot), niet dat we met een migrant te doen hebben.

Van de vliegtijd is uiteraard nog weinig te zeggen. Beide vangsten vonden plaats in de tweede helft van mei. Maar uit de Belgische blijkt, dat de vlinder tenminste tot half juni kan voorkomen.

Vindplaatsen. Lbg.: Steijn, ♂, 30.V.1963 (collectie-Missiehuis); Vaals, ♂, 17.V. 1953 (LÜCKER).

Variabiliteit. FREYER beschreef de soort naar materiaal uit Illyrië, een koninkrijk, dat in 1814 gevormd was uit het tegenwoordige Slovenië en Dalmatië en dat in zijn tijd nog bestond. De daar vliegende nominaatvorm heeft voorvleugels met een donkerbruin middenveld en lijkt sterk op *A. unanimis.* Op plaat 12 fig. 4, is een exemplaar uit het Pitztal in Zuid-Tirol afgebeeld (coll.-CARON), terwijl CULOT een fraaie afbeelding geeft van een exemplaar van Tramelan in de Zwitserse Jura (Noctuelles, pl. 30 fig. 4).

Het is zeer twijfelachtig, of deze nominaatvorm ook in onze omgeving voorkomt. De heer DE LAEVER schreef me, dat alle Belgische exemplaren, die hij gezien had, een zwart middenveld hadden, terwijl wortelveld en achterrandsveld licht afstaken. Ik beschik echter over veel te weinig materiaal om een nieuwe subspecies te kunnen beschrijven. Het op plaat 12 fig. 5 afgebeelde exemplaar (omgeving Querfurt, Oost-Duitsland) is donkerder dan de nominaatvorm, maar heeft geen zwart middenveld.

De beide Nederlandse exemplaren zijn extreem donker. Niet alleen het middenveld is zwart, maar ook het wortelveld. Alleen het achterrandsveld is dus lichter. Ik beschreef deze vorm als:

f. *nigrescens* Lempke, 1954, *Ent. Ber.* 15: 120, fig. Het holotype is nu nogmaals afgebeeld op plaat 12 fig. 6.

[I doubt whether the nominate form with darker brown central area of the fore wings occurs in our surroundings. M. DE LAEVER writes me, that all Belgian specimens known to him have a really black central area. The two Dutch specimens known at present form still

stronger extremes, because they also have a black basal area (cf. the holotype of f. *nigrescens*, plate 12 fig. 6). I wish only to draw attention to the possibility of all these specimens being a separate subspecies, characterised by much darker fore wings. But my experience with the species is too limited for any further conclusions.]

Apamea anceps Schiff., 1775 (*sordida* Borkhausen, 1792). *Tijdschr. Entom.* 90: 71; Cat. VIII: (481). De vlinder is het talrijkst in de duinstreek. Vooral op de waddeneilanden (die nu alle als vindplaats bekend zijn) is hij zeer gewoon. Maar ook op Schouwen trof LEFFEF hem talrijk aan. In het binnenland is *anceps* veel schaarser, al is hij hier zeker niet tot de zandgronden beperkt. Zowel in het Hafdistrict als in het Fluviatiel District is het dier op verscheidene plaatsen aangetroffen. Voor een deel zijn dit echter incidentele vondsten, die wel op zwervers betrekking hebben.

Geen nieuwe gegevens over de vliegtijd.

Vindplaatsen. Fr.: Vlieland (veel, CAMPING). Gr.: Glimmen, Noordlaren. Dr.: Eext, Grollo, Schoonlo, Odoornerveen. Ov.: Denekamp, Volthe, Saasveld, Rijssen, Colmschate, Raalte, Vollenhove. Gdl.: Stroe, Garderen, Wiessel, Hoog-Soeren, Hoenderlo, Kootwijkerveen, Dieren, Wageningen, Lunteren; Gorssel, Ruurlo, Winterswijk, Aerdt; Slijk-Ewijk. Utr.: Amerongen, Zeist, Amersfoort. N.H.: Amsterdam (1940, BOTZEN), Halfweg (1963, VAN AARTSEN), Zaandam (1952, KLOOS), Den Helder, Schoorl, Oostdorp, Egmond aan Zee, Heemskerk, Overveen, Aerdenhout. Z.H.: Noordwijk, Leiden, Meijendel, Schelluinen, Gorkum, Arkel, Hendrik-Ido-Ambacht, Rockanje, Hellevoetsluis, Melissant, Ouddorp. Zl.: Burgh, Haamstede, Westenschouwen, Oostkapelle. N.B.: Gassel, Mill, Nuenen, Geldrop, Bergeijk, Heeze. Lbg.: Griendsveen, Roggel, Arcen, Swalmen, Montfort, Echt, Sint Joost, Stein, Sittard, Heerlerbaan, Benzenrade, Chèvremont, Huls, Bocholtz, Colmond, Eijs, Geulem, Heer, Maastricht, Slavante, Gronsveld, Vijlen, Lemiers, Vaals.

Variabiliteit. f. *nigrescens* Hannemann, 1917. Deze donkere vorm (plaat 12 fig. 3) blijft zeldzaam. Nieuwe vindplaatsen: Winterswijk, Bennekom, Gassel (VAN DE POL); Meijendel (LUCAS); Bergeijk (VAN WISSELINGH).

f. *anceps* Hübner, [1809—1813]. Een exemplaar met licht bruinachtige voorvleugels van Bennekom (VAN DE POL) is het enige, dat ik verder van deze vorm gezien heb.

f. *engelhartii* Duurlo, 1889. Het exemplaar van Halfweg behoort tot deze lichte vorm en is kennelijk een zwerver uit het duingebied. Maar in het Zoöl. Mus. bevindt zich ook een lichtgrijs dier van Hatert.

f. *lactea* Cockayne, 1933. Geen nieuwe vindplaatsen van deze crèmekleurige vorm, waarvan een fraai exemplaar afgebeeld is op plaat 12 fig. 2.

f. *renardii* Boisduval, 1829. Van deze lichte zeer zwak getekende vorm werden exemplaren aangetroffen op Rottum (DIDDEN) en Vlieland (CAMPING).

f. *juncta* Lempke, 1949. Geen nieuwe vondsten.

f. *semiconfluens* Lempke, 1949. Vlieland (G. DIJKSTRA); Lunteren (BRANGER); Bennekom (VAN DE POL); Aalten (VAN GALEN); Meijendel (LUCAS); Oisterwijk (Zoöl. Mus.).

Dwerg. Vlieland (Zoöl. Mus.).

Pathologisch exemplaar. Linker achtervleugel langs de achterrand gedeeltelijk verbleekt. Heemskerk (Zoöl. Mus.).

Apamea sordens Hufnagel. *Tijdschr. Entom.* 90: 68; Cat. VIII: (478). De

vlinder is nu ook bekend van Vlieland, zodat alleen Rottum nog in de rij van de waddeneilanden ontbreekt. Overigens geen commentaar op de verspreiding.

De vliegtijd kan al in de laatste week van april beginnen en nog iets langer duren dan in 1949 bekend was. De uiterste data worden nu: 26.IV—28.VII. Op de vroege aprildatum werd in 1961 een exemplaar gevangen in het Amsterdamse Bos door PEERDEMAN. De late datum stamt uit 1949, toen de Eerw. Heer KNIPPENBERG een *sordens* te Sint Michielsgestel ving.

Variabiliteit. f. *pallida* Tutt, 1889. De vorm met lichte grondkleur (soms zelfs witachtig grijs) is vrij gewoon en komt vrijwel overal onder de soort voor.

f. *unicolor* Tutt, 1889. Beschreven als een vorm met donker roodachtig bruine grondkleur en onduidelijke tekening. Maar zulke zwak getekende exemplaren komen ook met andere grondkleur voor, zowel met de lichte van *pallida* als met de grijze van *cinerea*. Het lijkt me het verstandigste al zulke zwak getekende dieren onder de naam *unicolor* te verenigen. Vrij zeldzaam, maar wel tamelijk verbreid onder de soort.

f. *cinerascens* Tutt, 1889. Exemplaren met zuiver grijze voorvleugels zijn nogal zeldzaam, maar komen tamelijk verbreid onder de soort voor.

f. **obscura** nov. Grondkleur van de voorvleugels zwartgrijs, achtervleugels donkergrijs. Apeldoorn (LEFFEF); Slijk-Ewijk (VAN DE POL); Chèvremont (LUKKIEN); Gronsveld, ♂, 23.V.1964 (holotype, VAN WISSELINGH).

[Ground colour of the fore wings black-grey, hind wings dark grey.]

f. **bicolor** nov. Het middenveld van de voorvleugels van een andere kleur dan de rest van de vleugels en duidelijk afstekend (bij het holotype bruinachtig, terwijl de overige delen van de voorvleugels grijs zijn). Aalten, ♀, 28.V.1935 (holotype, VAN GALEN).

[The central area of the fore wings of another colour than the rest of the wings and distinctly contrasting (with the holotype the central area is brownish, basal and outer areas are grey).]

f. *cruda* Lempke, 1949. Weesp (WESTERNENG); Oostvoorne (LUCAS); Eijs (VAN DE POL).

f. **delineata** nov. De dwarslijnen op de voorvleugels ontbreken volkomen, maar de vlekken blijven duidelijk zichtbaar, in elk geval de niervlek. 's-Graveland (Nat.-hist. Mus. Zaandam); Muiderberg, Amsterdam (VAN DER MEULEN); Zaandam (AUKEMA); Aerdenhout, Plasmolen (VAN WISSELINGH).

Holotype: ♂ van Plasmolen, 9.VI.1958, in collectie-VAN WISSELINGH.

[The transverse lines on the fore wings fail completely, but the stigmata remain distinct, at least the reniform.]

f. *reducta* Lempke, 1949. Exemplaren zonder spoor van de ronde vlek werden nog gevangen te: Apeldoorn (Zoöl. Mus.); Oostvoorne (LUCAS); Geldrop (HAANSTRA).

f. *nictitans* Lempke, 1949. Nieuwe vindplaatsen: Delfzijl (VAN WISSELINGH); Apeldoorn, Noordwijk (Zoöl. Mus.); Amersfoort (NIEUWLAND).

f. *juncta* Lempke, 1941. Nieuwe vindplaats: Stein (Missiehuis).

f. *alinea* Turner, 1929. Exemplaren zonder de opvallende zwarte wortelstreep zijn zeldzaam. Nieuwe vindplaatsen: Apeldoorn (LEFFEF); Aalten (VAN GALEN); Amsterdam (PEERDEMAN); Nuenen (NEIJTS); De Rips (NIES); Brunssum (CLAASSENS).

Dwergen. Wageningen (BERGMAN); Apeldoorn (LEFFEF, in Zoöl. Mus.); Zeist (GORTER); Amsterdam, Amst. Bos (PEERDEMAN); Aerdenhout (VAN WISSELINGH); Meijendel (LUCAS); Melissant (HUISMAN).

Apamea scolopacina Esper. *Tijdschr. Entom.* 90: 82; Cat. VIII: (492). De in 1949 gegeven verbreiding is juist. Volgens LEFFEF wordt het optimale milieu gevormd door schraal grasland. In het Waddendistrict is de vlinder tot nog toe alleen op Terschelling aangetroffen.

De vliegtijd kan ongeveer een week eerder beginnen en later eindigen dan in Cat. VIII werd vermeld. De uiterste data worden nu: 19.VI (in 1962 waargenomen door LEFFEF) tot 25.VIII (in 1954 te Heemstede, VAN DE POL).

V i n d p l a a t s e n. Fr.: Terschelling (LEFFEF), Tietjerk, Oosterwolde, Nijetrijne. Gr.: Haren, Glimmen, Noordlaren. Dr.: Roden, Donderen, Zuidlaren, Eext, Schoonlo, Wijster, Vledder. Ov.: Saasveld, Abdij Sion, Colmschate. Gdl.: Hulshorst, Nunspeet, Wiessel, Teuge, Wageningen, Bennekom, Lunteren; Eefde, de Voorst, Winterswijk, Woold, Aalten; Slijk-Ewijk. Utr.: Amersfoort, Bilthoven, Bunnik, Utrecht, Maarsseveen. N.H.: 's-Graveland, Naarden, Muiderberg, Weesp, Amsterdamse Bos (één exemplaar in 1964, PEERDEMAN), Schoorl, Bergen, Heemskerk, Overveen, Aerdenhout. Z.H.: Oegstgeest, Voorschoten, Schelluinen (één exemplaar in 1959, SLOB), Hellevoetsluis, Melissant, Ouddorp. Zl.: Burgh, Haamstede, Westenschouwen, Oostkapelle, Valkenisse, Cadzand. N.B.: Nieuwkuik, Sint Michielsgestel, Schijndel, Haaren, Best, Nuenen. Lbg.: Griendsveen, De Hamert, Arcen, Sint Odiliënberg, Montfort, Merum, Stein, Nieuwenhagen, Amstenrade, Heerlerbaan, Aalbeek, Valkenburg, Heer, Gronsveld, Vijlen.

V a r i a b i l i t e i t. f. *abbreviata* Haworth, 1809. Deze bleke vorm is niet zeldzaam. Hij is op de meeste plaatsen onder de soort aan te treffen.

f. *unicolor-brunnea* Wagner, 1922. Ook deze eenkleurig bruine vorm is tamelijk verbreid, zodat geen afzonderlijke vindplaatsen meer worden vermeld.

f. **rufescens** nov. Grondkleur van de voorvleugels mooi roodachtig. Oostkapelle, ♂, 4.VII.1959 (holotype, VAN AARTSEN, in Zoöl. Mus.).

[Fore wings with beautiful reddish ground colour.]

f. **obscura** nov. Grondkleur van de voorvleugels donker bruinachtig, de witte niervlek duidelijk afstekend. De vorm is veel donkerder dan *unicolor-brunnea* en bovendien duidelijk getekend. Zeist (GORTER); Oostkapelle, Best, Venlo (VAN AARTSEN, in Zoöl. Mus.).

Holotype: ♂ van Best, 17.VII.1963, in genoemde collectie.

[Ground colour of the fore wings dark brownish, the white reniform distinctly contrasting. Much darker than *unicolor-brunnea* and also differing by its distinct markings.]

Dwergen. Twello (Zoöl. Mus.); Vorden (Leids Mus.); Ouddorp (HUISMAN).

Apamea ophiogramma Esper. *Tijdschr. Entom.* 90: 81; Cat. VIII: (491). Uit de combinatie van de twee lijsten van vindplaatsen blijkt de sterke verbreiding van

de vlinder in ons land. Vooral op vochtige terreinen kan hij zeer gewoon zijn, wat natuurlijk in verband staat met de levenswijze van de rups.

De vliegtijd kan tot in de tweede helft van augustus duren. De uiterste data worden nu: 26.V—20.VIII. De laatste datum werd genoteerd door KNOOP.

Vindplaatsen. Fr.: Terschelling, Sexbierum, Tietjerk, Eernewoude, Oosterwolde, Wolvega, Nijetrijne, Oude Mirdum, Tjerkwerd. Gr.: Veendam. Dr.: Eelderwolde, Donderen, Schoonlo, Odoorn. Ov.: Denekamp, Volthe, Albergen, Saasveld, Almelo, Raalte, Abdij Sion, Colmschate, Platvoet, Vollenhove, Zwartsluis. Flevoland: Lelystad. Gdl.: Garderbroek, Wiessel, Apeldoorn, Teuge, Laag-Soeren, Wolfheze, Wageningen, Lunteren; Gorssel, Eefde, Warnsveld, Zutfen, Ruurlo, Winterswijk, Woold, Eldrik, Montferland; Slijk-Ewijk, Geldermalsen, Neerijnen. Utr.: Zeist, Amersfoort, Loosdrecht. N.H.: 's-Graveland, Kortenhoef, Naarden, Naardermeer, Muiderberg, Weesp, Amsterdamse Bos, Halfweg, Landsmeer, Middelie, Beemster, Oosthuizen, Hoorn, De Koog (Texel), Schoorl, Bergen, Heemskerk, Aerdenhout. Z.H.: Noorden, Oegstgeest, Leidschendam, Delft, Staelduin, Vlaardingen, Capelle aan den IJssel, Schelluinen, Gorkum, Arkel, Dubbeldam, Hendrik-Ido-Ambacht, Oostvoorne, Rockanje, Hellevoetsluis, Middelharnis, Melissant, Goedereede, Ouddorp. Zl.: Haamstede, Burgh, Westenschouwen, Valkenisse, Cadzand. N.B.: Drunen, Sint Michielsgestel, Haaren, Kampina, Best, Bergeijk, Eindhoven, Geldrop, Nuenen, Helmond, Someren, Sint Anthonis, Gassel. Lbg.: Griendsveen, Tegelen, Steijl, Swalmen, Merum, Sint Odiliënberg, Montfort, Stein, Amstenrade, Heerlerbaan, Klimmen, Geulem, Gronsveld, Mechelen, Vijlen, Epen.

Variabiliteit. f. **pallescens** nov. De grote donkere vlek aan de voorrand van de voorvleugels grijsbruin, weinig afstekend, gele niervlek flauw zichtbaar, donkere tekening langs de achterrand vrijwel geheel ontbrekend. Bleke, bijna eenkleurige vorm. Weesp, ♀, 23.VII.1929 (holotype, Zoöl. Mus.).

[The large dark costal spot of the fore wings grey-brown, hardly contrasting; the yellow reniform feebly visible, dark markings along the outer border nearly absent. Pale, nearly unicolorous form.]

f. *rufescens* Lempke, 1949. De roodbruine vorm van *ophiogramma* werd verder bekend van: Aerdenhout (VAN WISSELINGH); Noorden (LUCAS); Valkenisse (VAN AARTSEN, in Zoöl. Mus.); Eindhoven (HAANSTRA).

f. *moerens* Staudinger, 1901. Van deze donkere vorm zijn zoveel nieuwe vindplaatsen bekend geworden, dat ze niet meer vermeld worden. Blijkbaar komt hij, hoewel vrij zeldzaam, verbreid onder de soort voor.

Dwerg. Bussum (TER LAAG).

Oligia Hübner

Oligia strigilis L. *Tijdschr. Entom.* 85: 137; Cat. VII: (464). Blijkens de beide lijsten van vindplaatsen in het hele land zeer verbreid, hoewel de vlinder op drogere gronden stellig zeldzamer is dan op vochtiger terreinen. Over het geheel genomen is *strigilis* duidelijk minder gewoon dan *latruncula.* In het Waddendistrict is de soort nu van één van de eilanden bekend.

De vliegtijd kan vroeger beginnen dan in 1943 bekend was en voortduren tot eind augustus. De uiterste data zijn nu: 13.V (in 1964 te Stein, Pater MUNSTERS) tot 30.VIII (in 1962 te Sexbierum, STOBBE).

Vindplaatsen. Fr.: Vlieland, Sexbierum, Harlingen, Leeuwarden, Tietjerk, Oosterwolde, Nijetrijne. Gr.: Groningen, Veendam. Dr.: Peizermade, Schipborg, Zuidlaren, Eext,

Grollo. Ov.: Denekamp, Volthe, Albergen, Saasveld, Almelo, Aadorp, Borne, Enschede, Rijssen, Raalte, Abdij Sion, Platvoet, IJsselmuiden, Zwartsluis, Vollenhove. Flevoland: Lelystad. Gdl.: Vierhouten, Wezep, Wiessel, Hoog-Soeren, Loenen, Wageningen, Lunteren; Eefde, Vorden, Ruurlo, Hackfort, Babberich; Slijk-Ewijk, Buren, Geldermalsen. Utr.: Zeist, Amersfoort, Maarsseveen, Harmelen. N.H.: 's-Graveland, Blaricum, Kortenhoef, Naarden, Weesp, Amsterdamse Bos (gewoon, PEERDEMAN), Halfweg, Zaandam, Middelie, Beemster, Hoorn, Den Helder, Bergen, Heemskerk, Aerdenhout, Heemstede. Z.H.: Noorden, Woerdense Verlaat, Lisse, Oegstgeest, Meijendel, Voorschoten, Leidschendam, Delft, Staelduin, Vlaardingen, Capelle aan den IJssel, Schelluinen, Gorkum, Arkel, Biesbosch, Dubbeldam, Hendrik-Ido-Ambacht, Oostvoorne, Rockanje, Middelharnis, Melissant. Zl.: Burgh, Haamstede, Valkenisse, Goes, Terneuzen. N.B.: Wouw, Galder, Oosterhout, Waalwijk, Drunen, Sint Michielsgestel, Uden, Gassel, Mill, Nuenen, Eindhoven, Geldrop, Heeze, Maarheeze, Helenaveen. Lbg.: Arcen, Swalmen, Heel, Sint Odiliënberg, Montfort, Stein, Amstenrade, Brunssum, Heerlerbaan, Chèvremont, Bocholtz, Eijs, Valkenburg, Geulem, Gronsveld, Rijckholt, Vijlen, Lemiers.

Variabiliteit. De typische vorm met donker bruinachtig middenveld en witte gewaterde band komt inderdaad het meest voor, tenminste over het gehele land gerekend.

f. *fasciata* Tutt, 1891. Exemplaren met zwartachtig middenveld, maar overigens niet afwijkend, zijn vrij schaars. Nieuwe vindplaatsen zijn: Lelystad, Wageningen (VAN DE POL); Wiessel, Apeldoorn (LEFFEF, in Zoöl. Mus.); Aerdenhout, Wassenaar, Arcen (VAN WISSELINGH); Heer (Mus. Rotterdam); Montfort (MAASSEN).

f. *amoena* Kroulikovski, 1908. Exemplaren met groenachtig getinte gewaterde band van Slijk-Ewijk, Oud-Beijerland en Gassel (VAN DE POL).

f. pallida nov. De normaal donkere delen van de voorvleugels zijn licht bruinachtig, de witte tekening niet afwijkend. Plaat 13 fig. 3. Delfzijl, ♂, 1922, Ankeveen, ♀, 30.VI.1907 (holotype, Zoöl. Mus.); Beemster (HUISENGA); Aerdenhout (VAN WISSELINGH); Goedereede (HUISMAN).

[The normally dark parts of the fore wings are pale brownish, the white markings not differing from the typical form.]

f. *intermedia* Helbig, 1933. Exemplaren, waarbij de gewaterde band niet wit is, maar grijsachtig (doch waarbij de tweede dwarslijn over de gehele lengte wit blijft), zijn niet al te zeldzaam, zoals blijkt uit een serie van ongeveer 20 stuks in het Zoöl. Mus.

f. *ferrea* Warren, 1911, „Seitz" 3: 172, plaat 40 rij k fig. 1. Voorvleugels eenkleurig grijs met fijne zwarte tekening van vlekken en dwarslijnen. Heeze, ♂, 1959, donkerder grijs dan het door WARREN afgebeelde exemplaar, maar duidelijk verschillend van de zwarte vorm (VAN WISSELINGH).

f. *suffumata* Warren, 1911. De vorm met zwartgrijze verdonkerde gewaterde band en vaak gereduceerde tweede dwarslijn is beslist niet zo gewoon als ik in 1943 schreef, hoewel hij wel tamelijk verbreid onder de soort is.

f. *aethiops* Haworth, 1809, Lep. Brit.: 215 (*aethiops* Osthelder, 1927). (Volgens TAMS & EDELSTEN, in SOUTH, Moths Brit. Isles (new edition) 1: 286, behoort de door HAWORTH beschreven vorm niet tot *Oligia latruncula,* maar tot *O. strigilis*). De geheel zwarte vorm komt blijkens de vele vindplaatsen verbreid onder de soort voor, ook in het westen van het land: Utrecht, Kortenhoef, Hoorn, Leiden, Oegstgeest, Melissant. In het zuiden van Limburg is de vorm inderdaad gewoon.

f. *conjuncta* Heydemann, 1932. De vorm met een zwarte streep van de tapvlek naar de tweede dwarslijn is gewoon.

Oligia versicolor Borkhausen. *Tijdschr. Entom.* 85: 136; Cat. VII: (463). Hoewel nog maar weinig nieuwe vindplaatsen bekend geworden zijn, is toch wel duidelijk, dat we het voornaamste biotoop in bosachtige gebieden moeten zoeken en dan wel voornamelijk in loofbosgebieden. Als bij zovele soorten is ook hier al een vangst bekend uit een volkomen afwijkend biotoop, maar deze verandert niets aan de totale indruk. De vlinder schijnt bij ons zeer lokaal te zijn en is tot nog toe nergens in het westen van het land aangetroffen.

Wat het omringende gebied betreft, uit België is nu een vangst bekend van Ivoz-Ramet bij Luik, waar in 1947 een ♂ door G. DASSE werd verzameld (*Lambillionea* 47: 38, 1947). Op de Britse eilanden is *versicolor* zeer verbreid in Engeland. In de nieuwe editie van „SOUTH" (Moths 1: 288, 1961) worden 12 Engelse graafschappen vermeld, waaruit de vlinder bekend is (Somerset ontbreekt er aan, dit graafschap werd reeds vermeld door DE WORMS in *Entomologist* 79: 72, 1946). Verder werd het dier aangetroffen in Wales, Schotland, op de Hebriden en in Ierland. Van dit laatste eiland vermeldt GREER twee exemplaren, die in 1903 in East Tyrone werden gevangen (*Entomologist* 78: 96, 1944).

De vliegtijd kan van de tweede week in juni tot begin augustus duren. De nu bekende uiterste data zijn: 9.VI—3.VIII.

Vindplaatsen. Fr.: Bolsward, ♂, 9.VI.1889 (Zoöl. Mus. ex coll.-VAN DER WEIJ). Gdl.: Winterswijk, 20.VI.1952 (VAN WISSELINGH), 18.VI.1956 (VAN DE POL). Utr.: Austerlitz, 17.VI.1953 (GORTER); Zeist, 21.VI.1951, 20.VI.1957 (idem). N.B.: Best, 27.VI.1960 en 3.VIII.1962 (VAN AARTSEN, in Zoöl. Mus.); Nuenen, herhaaldelijk gevangen en hier althans in sommige jaren beslist niet zeldzaam (NEIJTS); Eindhoven, 29.VI.1946 (VERHAAK). Lbg.: Arcen, juli 1950 (Zoöl. Mus.); Maalbroek, 19.VII.1955 (Mus. Rotterdam); Vijlen, 26.VI.1960 (GORTER).

Variabiliteit. De typische vorm met roodbruine grondkleur en grijze gewaterde band, terwijl ronde vlek en niervlek lichter zijn dan het roodachtige middenveld en duidelijk afsteken, komt bij ons niet veel voor. Van een serie van 20 exemplaren, die de heer NEIJTS in 1961 bij Nuenen verzamelde en die ik voor hem determineerde, behoorde er slechts één toe. Verder het exemplaar van Eindhoven (VERHAAK). Plaat 13 fig. 7.

f. *fasciata* Lenz, 1927, in OSTHELDER, Schmetterl. Südbayerns: 269, plaat XIV fig. 19, 20. Als de typische vorm, maar voorvleugels met witachtige scherp afstekende gewaterde band. (Vgl. HEYDEMANN, 1932, *Ent. Z. Frankfurt* 46: 56). Plaat 13 fig. 8. Winterswijk (VAN WISSELINGH).

f. *roseo-suffumata* Heydemann, 1932. Deze vorm onderscheidt zich vooral van de typische vorm door het donkerder franjeveld. Vgl. de reeds geciteerde afbeelding in „Seitz". Bolsward (Zoöl. Mus.); Nuenen (NEIJTS, negen stuks van de serie van 20).

f. *pseudolatruncula* Heydemann, 1932, *Ent. Z. Frankfurt* 46: 56; 1942, *Stett. ent. Z.* 103, plaat IV fig. 36, 37. Grondkleur van de voorvleugels donker grijsbruin, de vlekken lichter, gewaterde band licht grijsbruin, vaak vuil geelgrijs getint. Franjeveld weer donker. Zeist, 1951, 1957 (GORTER); Best, Arcen (Zoöl. Mus.);

Nuenen (NEIJTS, de helft van de in 1961 gevangen serie).

f. *aethiops* Heydemann, 1932. De vrijwel eenkleurig zwarte vorm (plaat 13 fig. 9) blijkt in elk geval niet de gewoonste te zijn. Nuenen (Zoöl. Mus.); Maalbroek (Mus. Rotterdam).

Oligia latruncula Schiff. *Tijdschr. Entom.* 85: 134; Cat. VII: (461). Algemeen verbreid over het gehele land zonder enige duidelijke voorkeur voor een bepaald biotoop. In het Waddendistrict blijkt de vlinder tot nog toe slechts op Vlieland en Terschelling aangetroffen te zijn. Overigens worden geen vindplaatsen meer vermeld.

De vliegtijd kan tot begin augustus duren. De uiterste data worden nu: 21.V—4.VIII (de laatste datum in 1962 te Westenschouwen, LEFFEF). In 1961 werden te Burgh op de Rivon-lamp telkens twee exemplaren gevangen op 4, 8 en 11 september (LEFFEF). Dit lijken toch wel vertegenwoordigers van een overigens weinig voorkomende partiële tweede generatie geweest te zijn.

V a r i a b i l i t e i t. De typische vorm met donker bruinachtig grijze tot donker bruinachtige voorvleugels en helder roodbruine gewaterde band is vrij zeldzaam. Nieuwe vindplaatsen: Peest (KOOI); Tietjerk (CAMPING); Vollenhove (WINTERS); Weesp (Zoöl. Mus.); Oegstgeest (KAIJADOE); Nuenen (NEIJTS).

f. *meretricula* Borkhausen, 1792. De vorm met licht grijsgele tot licht bruingele gewaterde band is gewoon en komt practisch overal onder de soort voor.

f. *fasciata* Lempke, 1943. Van de vorm met donkere grondkleur en witte scherp afstekende gewaterde band wordt een exemplaar afgebeeld op plaat 13 fig. 2. Ook deze is beslist niet zeldzaam, zoals blijkt uit de lijst van nieuwe vindplaatsen: Vlieland, Tietjerk, Bolsward, Eext, Rijssen, Apeldoorn, Middelie, Bergen-N.H., Wassenaar, Krimpen aan den IJssel, Melissant, Ooster Schengen.

f. *rufo-suffumata* Heydemann, 1942. De vorm met roodachtig middenveld is tot nog toe uitsluitend uit het westen van het land bekend. Nieuwe vindplaatsen: Blaricum (BERGMAN); Zaandam (BANK); Middelie (DE BOER); Beemster (DE VRIES); Voorschoten (GROENENDIJK); Den Haag, Oostkapelle, Valkenisse (Zoöl. Mus.); Oostvoorne (LUCAS); Rockanje (GORTER); Ouddorp (VROEGINDEWEIJ).

f. *intermedia* Hormuzaki, 1898, *Verh. zool.-bot. Ges. Wien* 48: 448. De vorm met vrijwel eenkleurig roodachtig bruine voorvleugels is beslist niet gewoon en tot nog toe ook bijna alleen uit het westen van het land bekend. Vlieland, Terschelling (CAMPING); Groningen, Haamstede (VAN WISSELINGH); Weesp, Den Haag (Zoöl. Mus.).

f. **grisea** nov. Voorvleugels eenkleurig grijs, zonder rood of bruin; tekening zichtbaar, maar niet opvallend afstekend, de witte kleur in de tweede dwarslijn kan geheel ontbreken. Vlieland, ♀ (CAMPING); Heeze, ♂, 5.VI.1959 (holotype, VAN WISSELINGH).

[Fore wings of a uniform grey, markings visible, but not strikingly contrasting; the white colour in the postmedian may fail completely.]

f. *unicolor* Tutt, 1891. De vorm met eenkleurig zwartachtig bruine voorvleugels is gewoon. Overgangsexemplaren met een wat lichter achterrandsveld zijn eveneens vrij gewoon.

f. *aeruginis* Edelsten & Tams, 1961, in SOUTH, Brit. Moths (new ed.) 1: 287 (*aethiops* auct. nec Haworth). De min of meer eenkleurig zwartachtige vorm. Gewoon, overal onder de soort. Volgens de Engelse auteurs is deze vorm nooit zo diep zwart als die van *strigilis,* maar onder het Nederlandse materiaal bevinden zich wel degelijk zulke intens zwarte exemplaren.

f. *rufo-aethiops* Heydemann, 1942, *Ent. Z. Stettin* 103: 10. Voorvleugels donker, als bij *unicolor* of *aeruginis,* maar het middenveld met koperkleurige glans. Apeldoorn, Renkum, Ubbergen, Weesp, Rotterdam, Breda (Zoöl. Mus.); Amsterdam (VAN DER MEULEN); Rockanje (GORTER).

f. *victiuncula* Heydemann, *Ent. Z. Frankfurt* 46: 80. Voorvleugels zwartachtig met diepzwarte duidelijk afstekende middenband. Halsteren (ASSELBERGS).

f. *juncta* Lempke, 1943. Oostvoorne (LUCAS).

Oligia fasciuncula Haworth. *Tijdschr. Entom.* 85: 133; Cat. VII: (460). Blijkens de beide lijsten van vindplaatsen is de vlinder over vrijwel het gehele land verbreid. Maar op vochtige terreinen is hij veel gewoner dan op droge. Vandaar ook het grote aantal vindplaatsen in het westen van het land. In het Waddendistrict tot nog toe alleen bekend van Terschelling, Ameland en Schiermonnikoog.

De vliegtijd kan in de derde decade van mei beginnen en tot in de derde decade van augustus duren. De uiterste data zijn nu: 24.V (in 1961 te Slijk-Ewijk, VAN DE POL, en te Stein, Pater MUNSTERS) tot 21.VIII (in 1962, Sexbierum, STOBBE).

Vindplaatsen. Fr.: Terschelling, Sexbierum, Harlingen, Leeuwarden, Eernewoude, Duurswoude, Oosterwolde, Nijetrijne (zeer algemeen, LEFFEF), Balk, Tjerkwerd. Gr.: Haren, Glimmen, Borgercompagnie, Veendam. Dr.: Paterswolde, Peizermade, Roden, Lieveren, Norg, Peest, Assen, Zuidlaren, Annen, Eext, Schoonlo, Ruinen, Vledder, Havelte. Ov.: Volthe, Albergen, Saasveld, Aadorp, Rijssen, Daarle, Raalte, Abdij Sion, Platvoet, Olst, Zwartsluis, Vollenhove, Marknesse. Gdl.: Harderwijk, Wezep, Wiessel, Hoog-Soeren, Assel, Teuge, Terwolde, Empe, Hoenderlo, Velp, Ede, Lunteren; Eefde, Winterswijk; Slijk-Ewijk, Ochten. Utr.: Doorn, Bunnik, Maarsseveen, Loosdrecht, Bilthoven, Amersfoort. N.H.: Blaricum, Huizen, Naarden, Naardermeer, Muiden, Weesp, Amsterdamse Bos (gewoon, PEERDEMAN), Kwadijk, Middelie, Beemster, Hoorn, Bakkum. Z.H.: Noorden, Woerdense Verlaat, Noordwijkerhout, Meijendel, Voorschoten, Leidschendam, Delft, Staelduin, Hillegersberg, Capelle aan den IJssel, Lekkerkerk, Schelluinen, Gorkum, Arkel, Hendrik-Ido-Ambacht, Oostvoorne, Rockanje, Hellevoetsluis, Melissant, Goedereede, Ouddorp. Zl.: Burgh, Haamstede, Westenschouwen, Oostkapelle. N.B.: Rijen, Chaam, Waalwijk, Nieuwkuik, Sint Michielsgestel, Veghel, Mill, Gassel, Haaren, Kampina, Nuenen, Eindhoven, Geldrop. Lbg.: Griendsveen, Sevenum, Sint Odiliënberg, Montfort, Stein, Amstenrade, Heerlerbaan, Chèvremont, Bocholtz, Hulsberg, Aalbeek, Maastricht, Gronsveld, Rijckholt, Epen, Vijlen, Lemiers, Vaals.

Variabiliteit. Bij de typische vorm varieert de grondkleur van een mooie dieprode tint tot lichter rood en zelfs bruinachtig rood, terwijl de tekening soms bijna afwezig is en dan weer duidelijk zichtbaar. De verwijzing naar „SOUTH", fig. 2, moet zijn: fig. 8.

f. *cana* Staudinger, 1871. Volgens de oorspronkelijke diagnose is dit een vorm met licht grijsachtige grondkleur maar met roodachtig middenveld. Dergelijke exemplaren komen weinig voor. Reeds TUTT gebruikte de naam voor alle dieren met lichte grondkleur maar met volledig donker middenveld, onafhankelijk van de tint daarvan (1891, Brit. Noct. 1: 102). In deze zin is *cana* de gewoonste van onze lichte vormen.

f. *pallida* Tutt, 1891. Deze lichte vorm, waarbij alleen het onderste deel van het middenveld nog donkerder is, maar het bovenste niet meer afsteekt, is eveneens gewoon, maar toch wat minder talrijk dan f. *cana*.

f. *extrema* Tutt, 1891, Brit. Noct. 1: 102. Voorvleugels eenkleurig licht grijsachtig zonder donkerder afstekend middenveld. Apeldoorn, Leiden (Zoöl. Mus.).

f. *brunneata* Warren, 1911. De vorm, waarbij de voorvleugels bruinachtig zijn, dus zonder rode tint, is niet gewoon. Marknesse, Bennekom, Terwolde, Winterswijk, Slijk-Ewijk (van de Pol); Loosdrecht (von Herwarth); Soest (Zoöl. Mus.); Aerdenhout (van Wisselingh).

f. **flavescens** nov. Voorvleugels vrijwel eenkleurig geelachtig bruin. Twello, ♂, 21.VI.1931 (holotype, Zoöl. Mus.); Volthe (van der Meulen).

[Fore wings nearly unicolorous yellowish-brown.]

f. **postnigra** nov. Achtervleugels diepzwart met scherp afstekende lichte franje. Kan zowel bij exemplaren met roodachtige voorvleugels als bij grijsachtige voorkomen. Eext, ♂, 6.VI.1964 (holotype), Halfweg (Zoöl. Mus.); Sevenum (van de Pol).

[Hind wings deep black with sharply contrasting pale fringes. Occurs both in specimens with reddish and with pale greyish fore wings].

Mesoligia Boursin

Mesoligia furuncula Schiff. *Tijdschr. Entom.* 85: 128; Cat. VII: (455). Hoewel de vlinder in het gehele land voorkomt, is hij toch wel het talrijkst in het westen (Hafdistrict, Duindistrict). Leffef vond hem veel op Terschelling, te Schoorl, Overveen, en vooral in het duingebied van Schouwen. Merkwaardig in dit verband is het voorkomen op de Britse eilanden: vooral langs de kusten (tot op de Orkaden toe), hoewel ook hier en daar in het binnenland (South, Moths (new ed.) 1: 289, 1961). Bij ons is het verschil tussen kustgebied en binnenland echter niet zo sterk en kan *furuncula* ook ver landinwaarts nog een gewoon dier zijn.

In het Waddendistrict is de vlinder met uitzondering van Rottum nu op alle eilanden aangetroffen.

De vliegtijd kan tot ver in september duren. Of hierbij soms sprake kan zijn van een partiële tweede generatie is op zijn minst zeer twijfelachtig. De uiterste data zijn nu: 26.V—23.IX. De laatste datum werd in 1941 door van Wisselingh te Wassenaar genoteerd als slot van een hele serie september-data. Bijna even laat is 21.IX.1956 (Lucas). In 1963 ving Peerdeman in het Amsterdamse Bos nog een exemplaar op 13.IX. Van de Pol noteerde twee septemberdata: 4.IX.1954 te Rijckholt en 9.IX.1956 te Heemstede.

V a r i a b i l i t e i t. Hoewel de vlinder zeer variabel is, maakt een serie uit het oosten van het land toch een geheel andere indruk dan een uit het westen. In de laatste komen veel meer lichte dieren voor.

De typische vorm met tweekleurige voorvleugels (wortelhelft donker roodbruin tot bruinachtig, franjehelft licht grijsbruin tot licht bruin) is vooral in de oostelijke helft van het land niet zeldzaam en op tal van plaatsen aangetroffen. In het westen komt hij daarentegen nauwelijks voor.

f. *pallida* Tutt, 1891. Deze lichte vorm (wortelhelft voorvleugels lichtgrijs, franjehelft witachtig, maar achtervleugels niet altijd wit) is vrij zeldzaam en vrijwel beperkt tot het westen. Nieuwe vindplaatsen: Hilversum, Muiden, Diemen, Cocksdorp, Hillegom, Den Haag, Rotterdam, Burgh (Zoöl. Mus.).

f. *pseudonychina* Heydemann, 1933. Deze bleke vorm met vrijwel eenkleurig geelwitte voorvleugels komt vooral in het Hafdistrict (ook Vollenhove, WINTERS), het Duindistrict en het westelijke deel van het Fluviatiel District voor. In het oosten veel zeldzamer (Gassel, VAN DE POL).

f. *bicoloria* Villers, 1789. Deze bonte vorm met grijsachtig bruine wortelhelft en witachtige franjehelft der voorvleugels is onze meest voorkomende vorm, althans over het hele land gerekend. Natuurlijk door overgangen met de andere vormen verbonden.

f. *antithesis* Schultz, 1934. Deze fel contrasterende vorm (donkerbruin—fel wit) is veel zeldzamer. Nieuwe vindplaatsen: Eefde (Zoöl. Mus.); Amerongen (BENTINCK); Purmerend (HUISENGA).

f. *reticulata* Tutt, 1891. Gewoon.

f. *humeralis* Haworth, 1809. Gewoon.

f. *insulicola* Staudinger, 1871. Gewoon.

f. **cinerascens** nov. Voorvleugels eenkleurig lichtgrijs. Melissant, ♂, 14.VIII. 1953 (holotype, HUISMAN).

[Fore wings pale grey, unicolorous. (This description corresponds more or less with TUTT's conception of f. *insulicola* Staudinger (Brit. Noct. 1 : 105, 1891). But that form has brownish fore wings. Cf. the figure of HERRICH-SCHÄFFER, cited by STAUDINGER).]

f. *terminalis* Haworth, 1809. Niet zeldzaam. Vrij verbreid onder alle populaties.

f. *pulmonariae* Duponchel, 1826. Zonder twijfel is deze bonte vorm zeldzaam (wortelhelft voorvleugels licht roodachtig okerkleurig, franjehelft licht okerkleurig tot lichtgrijs). Nieuwe vindplaats: Aalten (Zoöl. Mus.).

f. *rufa-reticulata* Tutt, 1891. Hetzelfde geldt voor de vorm met eenkleurig roodachtig gele duidelijk getekende voorvleugels. Nieuwe vindplaatsen: Wassenaar (VAN WISSELINGH); Groede (Zoöl. Mus.).

f. *rufuncula* Haworth, 1809. De vorm met eenkleurig licht roodachtige voorvleugels zonder duidelijke tekening is daarentegen niet zeldzaam, vooral niet in de westelijke helft van het land.

f. *nigrobrunnea* Heydemann, 1942, *Stett. ent. Z.* 103: 19, plaat IV fig. 4. Voorvleugels bijna eenkleurig donkerbruin tot zwartbruin. Terschelling (G. DIJKSTRA); Tjerkwerd (MULDER); Odoorn, Clinge (PEERDEMAN); Assel, Heemskerk, Oostkapelle (VAN AARTSEN, in Zoöl. Mus.); Slijk-Ewijk, Grubbenvorst, Gronsveld (VAN DE POL); Zeist (GORTER). Blijkbaar vrij verbreid, maar alleen onder modern materiaal.

f. *nigrescens* Lempke, 1943. De vorm met wortelhelft van de voorvleugels zwart en franjehelft donker grijs blijft zeldzaam. Nieuwe vindplaatsen: Odoorn (PEERDEMAN); Nuenen (NEIJTS); Epen (VAN WISSELINGH).

f. *obscura* Lempke, 1943. De vorm met eenkleurig zwartgrijze voorvleugels is wat minder zeldzaam. Nieuwe vindplaatsen: Noordlaren, Schijf (VAN DE POL);

Odoorn (PEERDEMAN); Apeldoorn (SOUTENDIJK); Zeist (GORTER); Aerdenhout (VAN WISSELINGH); Arcen (LUKKIEN).

f. *albimacula* Spuler, 1905. De vorm met geheel wit gevulde niervlek is verbreid onder de soort, maar over het algemeen toch wel vrij schaars.

f. *vinctuncula* Hübner, [1800—1803]. Over het midden van de eenkleurige voorvleugels loopt een opvallend zwart lijntje, dat zich echter verbreden kan tot een smal zwart bandje. Plaat 13 fig. 3. Hoewel de vorm zeldzaam is, is hij toch langzamerhand van tal van vindplaatsen bekend geworden, vooral in de oostelijke helft van het land. Maar ook in het westen komt hij nu en dan voor, zoals uit de beide lijsten van vindplaatsen blijkt. Nieuw zijn: Heerde, Aalten, Loerbeek, Heemskerk, Aerdenhout, Heemstede, Burgh, Teteringen, Hilvarenbeek, Bergeijk, Eindhoven, Someren, Deurne, Swalmen, Montfort, Stein, Sint Pietersberg, Epen.

f. **centrifasciata** nov. Voorvleugels bont, maar met hetzelfde smalle zwartachtige bandje als f. *vinctuncula.* Veel zeldzamer dan bij de eenkleurige vorm. Plaat 13 fig. 6. Bergeijk, ♂, 21.VIII.1960 (holotype, VAN WISSELINGH).

[Fore wings variegated, but with the same narrow blackish band as f. *vinctuncula.* Much rarer than with the unicolorous form.]

f. *unicolor* Warren, 1911. Deze vorm, waarbij het donkere bandje of lijntje slechts iets donkerder is dan de grondkleur, is veel zeldzamer. Plaat 13 fig. 4. Nieuwe vindplaatsen: Eefde (Zoöl. Mus.); Loerbeek (PEERDEMAN); Hilversum (CARON).

f. *constricta* Heydemann, 1935. Bonte exemplaren, waarbij de donkere wortelhelft en de lichte achterrandshelft van de voorvleugels door een smal donkerder middenveld van elkaar gescheiden zijn, zijn vrij zeldzaam. Plaat 13 fig. 5. Nieuwe vindplaatsen: Colmschate (LUKKIEN); Apeldoorn, Amsterdam, Valkenisse, Best, Oostkapelle (Zoöl. Mus.); Aalten (VAN GALEN); Den Haag (FISCHER).

f. **lineata** nov. Voorvleugels eenkleurig (bij het holotype grijsbruin), de omranding van de twee vlekken en de eerste en tweede dwarslijn zwartachtig, golflijn licht. Deze drie lijnen scherp afstekend. Valkenisse, ♂, 31.VII.1964 (holotype, VAN AARTSEN, in Zoöl. Mus.).

[Fore wings unicolorous (with the holotype grey-brown), circumscription of the stigmata and the antemedian and postmedian blackish, subterminal pale. These three lines sharply contrasting.]

f. *conjuncta* Heydemann, 1942, *Stett. ent. Z.* 103: 19, plaat IV fig. 6. Vanuit de tapvlek loopt een zwartbruin streepje door het middenveld tot de tweede dwarslijn. Ameland (CAMPING); Muiden, Amsterdam, Den Haag, Rotterdam (Zoöl. Mus.).

f. *longistriata* Warren, 1911, in SEITZ, Gross-Schmetterl. 3: 173, plaat 40 rij 1 fig. 8. Op de bovenzijde van de voorvleugels een scherpe zwarte horizontale lijn even boven de binnenrand van wortelveld tot achterrand. Hoorn, 1958 (P. DE VRIES).

f. *latistriata* Hoffmeyer & Knudsen, 1935. Deze vorm heeft in plaats van de dunne lijn een veel bredere zwarte streep. Nieuwe vindplaats: Zeist (GORTER).

f. *minor* Dufrane, 1932. Gewoon.

Mesoligia literosa Haworth. *Tijdschr. Entom.* 85: 132; Cat. VII: (459). Het optimale biotoop wordt in ons land stellig gevormd door het duingebied, waar de vlinder plaatselijk zeer gewoon kan zijn, ook op de waddeneilanden. In het binnenland is *literosa* veel lokaler en schaarser en ook daar is het dier vrijwel beperkt tot de zandgronden (waarvoor soms ook de spoordijken dienst kunnen doen). Opvallend is het geringe aantal vindplaatsen in Noord-Brabant en Limburg. Met uitzondering van Rottum is de vlinder nu bekend van alle waddeneilanden.

De vliegtijd kan tot half september voortduren. De uiterste data zijn nu: 25.VI—15.IX.

Vindplaatsen. Fr.: Vlieland, (op het reeds vermelde eiland Terschelling zeer gewoon, LEFFEF), Nijetrijne (enkele, LEFFEF), Nije Mirdum. Gr.: Appelbergen, Veendam. Dr.: Peize, Zuidlaren, Schoonlo, Odoornerveen. Ov.: Raalte, Abdij Sion, Holten, Colmschate, Platvoet. Gdl.: Wiessel, Assel, Uchelen, Hoenderlo, Kootwijkerveen, Bennekom, Lunteren; Eefde, Almen, Ruurlo, Winterswijk. Utr.: Utrecht. N.H.: Zaandam, Hoorn, De Koog, Sint Maartensbrug, Bergen, Egmond aan Zee, Egmond aan den Hoef, Castricum, Bakkum, Heemskerk, Aerdenhout. Z.H.: Leiden, Meijendel, Rijswijk, Rotterdam, Oostvoorne, Hellevoetsluis, Melissant, Ouddorp. Z.H.: Burgh, Haamstede, Westenschouwen (op deze drie plaatsen gewoon tot talrijk, LEFFEF), Oostkapelle, Valkenisse, Cadzand. N.B.: Schijf, Bergeijk. Lbg.: Griendsveen, Gronsveld, Vijlen.

Variabiliteit. f. *subrosea* Warren, 1911. Van de vorm met roodachtig bruine voorvleugels zijn slechts enkele nieuwe vindplaatsen bekend geworden. Rijswijk-Z.H., Oostkapelle (Zoöl. Mus.).

f. *constricta* Warren, 1911. Ook de vorm met smal donker middenveld is niet gewoon. Nieuwe vindpaatsen: Egmond aan Zee (Zoöl. Mus.); Oostkapelle, Valkenisse (VAN AARTSEN, in Zoöl. Mus.).

f. *modesta* Diehl, 1957, *Bombus* 1: 405. Voorvleugels lichtgrijs, maar naar de achterrand nog met de paarsachtige tint van de typische vorm, tekening zeer zwak; achtervleugels lichter, naar de achterrand iets verdonkerd. Vooral onder de duinpopulaties komen nu en dan zeer zwak getekende exemplaren voor, die echter niet tot de volgende vorm gerekend kunnen worden. Vlieland (LUKKIEN); Twello, Heemskerk, Den Haag, Valkenisse, Venlo (Zoöl. Mus.); Egmond aan den Hoef (CARON).

f. *onychina* Herrich-Schäffer, 1856. De vorm met eenkleurig grijsachtige of geelachtig grijze voorvleugels is een typische duinvorm, maar voor zover ik weet, maakt hij overal slechts een klein deel van de populatie uit. Nieuwe vindplaatsen: Vlieland (CAMPING); Sint Maartensbrug (DE BOER); Egmond aan den Hoef (CARON); Burgh (PEERDEMAN); Valkenisse (VAN AARTSEN, in Zoöl. Mus.).

f. *juncta* Lempke, 1943. Meijendel (LUCAS).

Dwergen. Schiermonnikoog, Oostkapelle (Zoöl. Mus.).

Mesapamea Heinicke

Mesapamea secalis L. *Tijdschr. Entom.* 90: 76; Cat. VIII: (486). Met uitzondering van Rottum is de vlinder nu van alle waddeneilanden bekend. Overigens kan voor de verbreiding en het voorkomen naar Cat. VIII verwezen worden.

In vroege jaren kan de vliegtijd al in mei beginnen. De uiterste data zijn nu: 16.V (in 1959 te Stein waargenomen, Pater MUNSTERS) tot 14.IX.

Variabiliteit. Een veel eenvoudiger en dus ook veel grover indeling van de vele vormen wordt gegeven door HEINICKE (1960, *Deutsche ent. Z.* (N.F.) 7: 166—173). Hier wordt echter weer de uitvoerige indeling van 1949 gevolgd. Stellig zullen diverse telkens weer terugkerende vormen (kleur van de niervlek, aan- of afwezigheid van de tapvlekstreep enz.) wel door erfelijke factoren bepaald worden, terwijl verschillende in elkaar overgaande tinten van grondkleur ten dele wel veroorzaakt zullen worden door oecologische factoren tijdens het gevoelige stadium van de pop. Experimenteel is hierover echter niets bekend.

De typische vorm — zie Cat. VIII: (489) — is niet zeldzaam en is op tal van plaatsen onder de soort aangetroffen.

f. *grisea-flavo* Tutt, 1891. Zeldzaam. Nieuwe vindplaatsen: Platvoet (LUKKIEN); Oisterwijk (LUCAS); Nuenen (NEIJTS).

f. *grisea-albo* Tutt, 1891. Evenmin gewoon. Weesp, Amsterdam, Heemskerk (Zoöl. Mus.); Hendrik-Ido-Ambacht (BOGAARD); Melissant (HUISMAN).

f. *reticulata-albo* Tutt, 1891. Ermelo (JONKER); Bolsward, Amsterdam, Halfweg, Voerendaal (Zoöl. Mus.); Middelie (DE BOER); Heemstede (HERWARTH).

f. *reticulata-flavo* Tutt, 1891. Niet gewoon, maar toch vrij verbreid onder de soort.

f. *secalina-albo* Tutt, 1891. Zeldzaam. Apeldoorn (LUCAS); Vorden, Hilversum (Zoöl. Mus.); Eindhoven (VERHAAK); Helmond (KNIPPENBERG).

f. *secalina-flavo* Tutt, 1891. Eveneens zeldzaam. Bolsward, Weesp, Den Haag (Zoöl. Mus.); Vollenhove (WINTERS); Apeldoorn (LUCAS).

f. *virgata-albo* Tutt, 1891. Volthe (VAN DER MEULEN); Tongeren, Apeldoorn, Lochem, Weesp (Zoöl. Mus); Aalten (VAN GALEN); Zeist (GORTER); Middelie (DE BOER); Amsterdamse Bos (PEERDEMAN); Vlaardingen (VAN KATWIJK).

f. *virgata-flavo* Tutt, 1891. Niet zeldzaam. Alleen in Zoöl. Mus. bevindt zich al een serie van 15 exemplaren.

f. *i-niger-albo* Tutt, 1891. Niet zeldzaam, vrij verbreid.

f. *i-niger* Haworth, 1809.Vrij gewoon, overal onder de soort.

f. *oculea* Guenée, 1852. Vrij gewoon. De meeste exemplaren zijn wijfjes.

f. *oculea-flavo* Tutt, 1891. Gewoon. Ook hoofdzakelijk wijfjes.

f. *rufa-albo* Tutt, 1891. Nogal schaars, maar van vrij veel vindplaatsen bekend.

f. *rufa-flavo* Tutt, 1891. Meer dan de vorige vorm, maar zeker niet gewoon.

f. *nictitans* Esper, [1788]. Zeer gewoon, zowel bij ♂ als bij ♀.

f. *secalina* Hübner, [1808—1809]. Gewoon bij beide geslachten.

f. *nictitans-linea* Tutt, 1891. Zeer gewoon.

f. *secalinea-linea* Tutt, 1891. Zeer gewoon.

f. *rava* Haworth, 1809. Slechts enkele nieuwe vindplaatsen: Oosterwolde (VAN RANDEN); Soest (Zoöl. Mus.); Middelie (DE BOER); Vlaardingen (VAN KATWIJK).

f. *rava-flavo* Tutt, 1891. Blijkens de mij nu bekende vindplaatsen vrijwel overal in klein aantal onder de soort voorkomend.

f. *didyma* Esper, [1788]. Een schaars voorkomende vorm, waarvan slechts enkele nieuwe vindplaatsen bekend werden: Bathmen (Zoöl. Mus.); Middelie (DE BOER); Schelluinen (SLOB).

f. *didyma-flavo* Tutt, 1891. Veel gewoner dan de vorm met witte niervlek, wel overal onder de soort aan te treffen.

f. *furca* Haworth, 1809. Ook weer veel minder dan de typische door LINNAEUS beschreven vorm met gele niervlek. Nieuwe vindplaatsen: Wijster (LUCAS); Weesp, Valkenisse, Venlo (Zoöl. Mus.).

f. *nigra-albo* Tutt, 1891. Niet gewoon. Vlieland (CAMPING); Bathmen, Apeldoorn (Zoöl. Mus.); Zutfen (WILMINK); Helmond (KNIPPENBERG).

f. *nigra-flavo* Tutt, 1891. Eveneens zeer schaars. Voerendaal (Zoöl. Mus.).

f. *lugens* Haworth, 1809. Vrij zeldzaam, maar verbreid.

f. *lugens-flavo* Tutt, 1891. Niet zeldzaam (in Zoöl. Mus. op het ogenblik een serie van 19 stuks).

f. *leucostigma* Esper, [1791]. Ook maar enkele nieuwe vindplaatsen: Halle-Gdl. (NIEUWLAND); Ingen (Zoöl. Mus.); Bergeijk (VAN OOSTEN); Heerlerbaan (LUKKIEN).

f. *flavistigma* Lempke, 1949. Eveneens schaars. Apeldoorn, Bussum, Weesp (Zoöl. Mus.); Noorden (LUCAS).

f. *pulverosa* Warren, 1911. De vorm met wit bestoven aderen komt weinig voor. Nieuwe vindplaatsen: Leeuwarden (Mus. Leeuwarden); Hooghalen (VAN DER MEULEN); Westerbork (VAN AARTSEN, in Zoöl. Mus.); Apeldoorn (LEFFEF); Aalten (VAN GALEN); Hoorn, Haamstede, Someren (PEERDEMAN); Vlaardingen (VAN KATWIJK).

f. *struvei* Ragusa, 1885. Zeldzaam. Almelo, Saasveld (VAN DER MEULEN); Aalten (VAN GALEN); Oostvoorne (LUCAS).

f. *struvoculea* Aubert, 1952, Papillons d'Europe 2: 39, fig. D; 1953, *Rev. franç. de Lép.* 14: 110, pl. V fig. 8. Als f. *oculea* Guenée (en de door LINNAEUS beschreven typische vorm), maar de grondkleur van de voorvleugels wit en de grote donkere vlek aan de voorrand donkerbruin. Assen, Vogelenzang, Epen (VAN WISSELINGH); Deventer (♀), Twello (♂ en ♀), De Bilt (♂) (Zoöl. Mus.); Lelystad (VAN DE POL); Apeldoorn (DE VOS); Beemster (HUISENGA); Kerkrade (FRANSSEN).

[AUBERT only knew females of this form, but the Dutch material proves that the form also occurs with the male. It is, however, a fact that specimens which have the same colour pattern as f. *oculea*, are principally females.]

[f. *struvei-excessa* Turner, 1932. Als *struvoculea,* maar de grote voorrandsvlek is zwartachtig. Van de in Cat. VIII vermelde exemplaren behoort geen enkele tot deze vorm. Hij moet voorlopig als inlands vervallen.]

f. *lilacina* Warren, 1911. Slechts enkele nieuwe vindplaatsen: Vriezenveen (VAN DER MEULEN); Ermelo (JONKER); Zeist (GORTER); Noorden (LUCAS); Valkenisse (VAN AARTSEN, in Zoöl. Mus.).

f. *lilacina-flavo* Wightman, 1933. Wiessel (LUCAS); Valkenisse (VAN AARTSEN, in Zoöl. Mus.).

f. *uniformis* Spuler, 1905. Geen nieuwe vangsten.

f. *armoricae* Culot, 1909, Noct. et Géom. d' Europe 1: 164, plaat 30 fig. 7. Voorvleugels licht bruingrijs, dwarslijnen zeer flauw, alleen de tapvlekstreep duidelijk afstekend; niervlek geelachtig wit. Raalte, ♂, 1960 (FLINT); Nunspeet, ♂, 1921 (Zoöl. Mus.).

f. **albomaculata** nov. Voorvleugels met volle witte niervlek zonder donkere tekening erin. Diepenveen, ♂, 26.VII.1912 (holotype, Zoöl. Mus.); Zeist (GORTER); Halfweg, ♀, (VAN AARTSEN, in Zoöl. Mus.); Amsterdamse Bos (PEERDEMAN).

[Fore wings with full white reniform without dark centre.]

f. *obsoleta* Lempke, 1949. Niet zeldzaam.

f. *juncta* Lempke, 1949. Halfweg, Valkenisse (VAN AARTSEN, in Zoöl. Mus.).

f. *semiconfluens* Lempke, 1949. Apeldoorn (LEFFEF); Breda (Zoöl. Mus.); Eijs (VAN DE POL).

f. **approximata** nov. Het middenveld van de voorvleugels sterk versmald. Zeist, ♂, 17.VII.1957 (holotype, GORTER).

[The central area of the fore wings strongly narrowed.]

f. *clausa* Lempke, 1949. Aerdenhout (VAN WISSELINGH).

f. **brevipennis** nov. Alle vleugels te kort. Sint Michielsgestel (holotype, KNIPPENBERG).

[All wings too short.]

Dwergen. Komen bij deze soort blijkbaar nogal veel voor. Ik heb aantekeningen van meer dan een dozijn vindplaatsen.

Somatische mozaiek. Een exemplaar, dat mogelijk tot deze afwijking hoort, heeft op de linker voorvleugel een gele niervlek en op de rechter een witte. Hilversum, ♂, 1940 (Zoöl. Mus.).

Photedes Lederer

Photedes minima Haworth, 1806. Lep. Brit.: 215 (*arcuosa* Haworth, 1806, op. cit.: 260). *Tijdschr. Entom.* 85: 90; Cat. VII: (417). De vlinder is verbreid over een groot deel van het land, doch mijdt droge gronden, zoals duidelijk blijkt uit het geringe aantal vindplaatsen op de Veluwe. Maar ook in het kale polderland komt hij nauwelijks voor. Het voornaamste biotoop schijnt gevormd te worden door niet te droge terreinen in de omgeving van loofhout. De soort is nu van drie van de waddeneilanden bekend.

Op plaatsen waar *minima* voorkomt, is hij toch zelden gewoon te noemen. Bovendien zijn de meeste exemplaren, die met de vanglamp bemachtigd worden, mannetjes. De veel kleinere en duidelijker getekende wijfjes zijn in haast alle collecties zeer schaars vertegenwoordigd. Mogelijk zijn ze veel trager dan de mannetjes.

De vliegtijd kan van begin juni tot half augustus duren. De uiterste data zijn nu: 1.VI (1960, Nieuw-Helvoet, VROEGINDEWEIJ) tot 14.VIII (1963, ♀ te Best, VAN AARTSEN).

Vindplaatsen. Fr.: Terschelling (weinig, LEFFEF), Vlieland (CAMPING), Schiermonnikoog (STOBBE), Eernewoude, Nijetrijne (slechts enkele exemplaren, LEFFEF). Gr.: Vlagtwedde, Ter Borg. Dr.: Schoonlo, Wijster, Vledder. Ov.: Denekamp, Volthe, Almelo,

Holten, Ommen, Beerse, Diepenveen, Deventer, Vollenhove. Gdl.: Lunteren, Wageningen; de Voorst, Ruurlo, Babberich, Loerbeek, Aerdt; Heteren. N.H.: 's-Graveland, Hilversum, Blaricum, Weesp, Amsterdamse Bos (geregeld, maar weinig, PEERDEMAN), Halfweg, Zaandam, Heemskerk, Heemstede. Z.H.: Noorden, Staelduin, Schelluinen, Arkel, Hendrik-Ido-Ambacht, Oostvoorne, Nieuw-Helvoet, Hellevoetsluis, Melissant. Zl.: Burgh, Haamstede, Westenschouwen (al deze plaatsen schaars, LEFFEF), Oostkapelle, Valkenisse, Cadzand. N.B.: Vught, Kampina, Best, Eindhoven, Nuenen, Schaft, Someren, de Rips. Lbg.: Sevenum, Griendsveen, Stein, Amstenrade, Brunssum, Geulem, Heer, Vijlen, Vaals.

Variabiliteit. f. *lutescens* Haworth, 1809. De vorm met opvallend geelachtige voorvleugels is vrij zeldzaam. De collectie van het Zoöl. Mus. telt op het ogenblik slechts zeven exemplaren van Vorden, Leiden, Hillegersberg en Venlo. Blijkbaar is hij wel vrij verbreid onder de soort.

f. **obscura** nov. Opvallend verdonkerde vorm. Bij het ♂ voorvleugels langs de binnenrand van de golflijn en tussen golflijn en achterrand verdonkerd, bij het ♀ bovendien de twee dwarslijnen veel scherper; bij beide seksen de achtervleugels opvallend verdonkerd. Zie plaat 13 fig. 11 en 12. Amsterdamse Bos (PEERDEMAN); Best, 17.VII.1963 (twee mannetjes, waarvan één het holotype is, VAN AARTSEN, in Zoöl. Mus.); Swalmen (LÜCKER); Gronsveld (GORTER).

[Strikingly darkened. With the ♂ fore wings along the inner side of the submarginal and between this line and the outer border darkened, with the ♀ moreover the transverse lines much sharper; with both sexes the hind wings distinctly darkened.]

f. *grisescens* Lempke, 1943. Geen nieuwe vindplaatsen.

f. *luciola* Prochaska, 1920. Geen nieuwe vindplaatsen.

f. *airae* Freyer, 1836. Mannetjes met volledige donkere dwarslijnen op de voorvleugels komen niet veel voor. Nieuwe vindplaats: Geulem (Zoöl. Mus.).

f. **approximata** nov. De eerste en de tweede dwarslijn op de bovenzijde van de voorvleugels staan dicht bij elkaar. Best, ♂, 3.VIII.1962 (holotype, VAN AARTSEN, in Zoöl. Mus.).

[The antemedian and the postmedian are close together.]

f. **obsoleta** nov. Op de bovenzijde van de voorvleugels ontbreekt elk spoor van tekening op enkele zwakke stippen op de plaats van de tweede dwarslijn na. Wel op de meeste plaatsen onder de mannetjes voorkomend.

Holotype: ♂, Hillegersberg, 7.VII.1893, in Zoöl. Mus.

[All markings on the upper side of the fore wings fail with the exception of a few feeble points in the place of the postmedian.]

Photedes extrema Hübner. *Tijdschr. Entom.* 85: 73; Cat. VII: (400). De vlinder is bij ons in de eerste plaats een duindier. In dit biotoop kan hij plaatselijk gewoon zijn. Maar daarnaast is hij de laatste jaren ook op enkele plaatsen in het binnenland aangetroffen. Sommige daarvan stemmen overeen met een uit Engeland bekend biotoop van de soort, namelijk moerassige terreinen.

Wat de verspreiding in het omringende gebied betreft, in Denemarken is *extrema* reeds in 1940 aan de oostkust van Falster gevonden, maar toen niet herkend. Zie E. PYNDT, *Flora og Fauna* 64: 203, fig., 1958. In het oosten van Holstein werd het eerste exemplaar in 1953 te Kellenhusen gevangen (*Mitt. faun. Arb.gemeinsch.*

Schlesw.-Holst., Hamburg u. Lübeck (N.F.) 6: 63, 1953). In België is volgens mededeling van de heer De Laever de verspreiding vrijwel als bij ons: gewoon in de kuststreek, zeldzaam in het binnenland: Grand Han (prov. Luxemburg), Sclessin (prov. Luik), Sutendael (Limburg) en Groenendael (Brussel).

De vliegtijd kan al half mei beginnen en nog voortduren in de tweede helft van juli. De uiterste data zijn nu: 13.V (in 1959 te Oostvoorne, Lucas) tot 24.VII (in 1962 op Schouwen, Leffef). Daarnaast zijn enkele data uit augustus bekend geworden: 13.VIII.1963. Cadzand (Peerdeman) en 21.VIII.1960, Heemskerk (van Aartsen). Mogelijk zijn dit vertegenwoordigers van een partiële tweede generatie. De hoofdvliegtijd van de vlinder is juni.

Vindplaatsen. Fr.: Terschelling (gewoon, Tanis), Vlieland (Camping), Nijetrijne, 1964 (Leffef), Oude Mirdum, 1961 (idem). N.H.: Hilversum, 2.VI.1947, gaaf ♀ op licht (Caron), Bergen, Egmond aan Zee, Castricum, Heemskerk, Beverwijk, Heemstede. Z.H.: Leiden (Kroon, Lucas), Meijendel, Staelduin, Dordrecht, 17.VI.1905 (de Joncheere, in Leids Mus.), Oostvoorne, Rockanje, Hellevoetsluis, Goedereede. Zl.: Burgh, Westenschouwen, Oostkapelle, Cadzand. Lbg.: Griendsveen, 1964 (Leffef), Sevenum (idem), Swalmen, ♀, 1959 (van Aartsen, in Zoöl. Mus.); Gronsveld, 1962 (Peerdeman).

Variabiliteit. f. *radiata* Wagner, 1922. Dieren met opvallend donkere bestuiving tussen de aderen werden nog bekend van Heemskerk (van Aartsen), Aerdenhout (van Wisselingh), Wassenaar, Meijendel, Oostvoorne (Lucas).

f. *pallida* Lucas, 1959, *Ent. Ber.* 19: 205. Voorvleugels eenkleurig witachtig, zonder donkere schubben of tekening. Wijk aan Zee (Zoöl. Mus.); Aerdenhout (van Wisselingh); Meijendel (Lucas).

f. *punctilinea* Lucas, 1959, *Ent. Ber.* 19: 205. De voorvleugels met volledige eerste en tweede dwarslijn, doordat de in de regel aanwezige donkere stippen met elkaar verbonden zijn. Aerdenhout (van Wisselingh); Meijendel, Oostvoorne (Lucas).

f. *tangens* Lucas, 1960, *Ent. Ber.* 20: 229. De (in de regel slechts gedeeltelijk aanwezige) eerste en tweede dwarslijn raken elkaar even boven de binnenrand van de voorvleugels en gaan dan weer uiteen. Heemskerk, vijf exemplaren (van Aartsen, in Zoöl. Mus.); Oostvoorne (Lucas).

f. *depunctata* Lempke, 1943. Exemplaren, waarbij de stippenrij op de plaats van de tweede dwarslijn ontbreekt, zijn niet zeldzaam en komen in elke voldoend grote serie voor.

Photedes elymi Treitschke. *Tijdschr. Entom.* 85: 75; Cat. VII: (402). In verband met de voedselplant van de rups, de helm, is de vlinder vrijwel uitsluitend aan te treffen in het duingebied, zowel van het vasteland als van de eilanden. Hier kan hij plaatselijk zeer gewoon zijn. Met uitzondering van Texel kennen we hem nu van alle waddeneilanden. Op het reeds vermelde Rottum trof Didden het dier in 1959 en 1960 weer talrijk aan.

De vliegtijd kan lang duren, namelijk van begin mei tot begin september. Of we soms met exemplaren van een partiële tweede generatie te doen hebben, is moeilijk uit te maken, daar een duidelijk hiaat ontbreekt. De uiterste data zijn nu: 4.VI (in 1963 te Cadzand, Peerdeman) tot 2.IX (in 1962 te Oostvoorne, Lucas).

Vindplaatsen. Fr.: Ameland, Terschelling (talrijk volgens verschillende verzame-

laars), Vlieland (idem, CAMPING). N.H.: Bergen, Egmond aan Zee, Aerdenhout, Heemstede. Z.H.: Leiden (LUCAS), Meijendel, Oostvoorne, Melissant, Goedereede. Zl.: Oostkapelle, Zoutelande (Walcheren), Valkenisse, Cadzand.

Variabiliteit. f. *saturatior* Staudinger, 1889. Exemplaren met bruinachtige voorvleugels werden nog bekend van Rottum (DIDDEN); Huizen (Zoöl. Mus.); Egmond aan Zee (WESTERNENG).

f. **suffusa** nov. Voorvleugels grotendeels zwartachtig verdonkerd, alleen onder de middencel blijft in de regel nog een baan van de lichte grondkleur. Terschelling, Aerdenhout (VAN WISSELING); Valkenisse, ♂, 26.VII.1962 (holotype, VAN AARTSEN, in Zoöl. Mus.); Cadzand (PEERDEMAN).

[Fore wings for the greater part darkened, but as a rule a stripe of the normal pale ground colour remains under the cell.]

f. *depunctata* Nordström, 1940. De vorm zonder de rij zwarte stippen op de plaats van de tweede dwarslijn werd nog bekend van Terschelling, Aerdenhout (VAN WISSELINGH); Oostkapelle, Zoutelande (Zoöl. Mus.). Waarschijnlijk niet zeldzaam.

f. **tangens** nov. De (meestal slechts gedeeltelijk zichtbare) eerste en tweede dwarslijn ontmoeten elkaar even boven de binnenrand en gaan dan weer uit elkaar. Terschelling, ♂, 2.VII.1948 (holotype, Zoöl. Mus.).

[The antemedian and the postmedian (which as a rule are only partly present) meet each other a little above the inner margin of the fore wings and then separate again.]

f. *renifera* Nordström, 1940. Exemplaren met duidelijk zichtbare niervlek komen weinig voor. Ik zag er alleen nog van Rottum (DIDDEN).

Photedes fluxa Haworth. *Tijdschr. Entom.* 85: 74; Cat. VII: (401). Het talrijkst is de vlinder in het duingebied, zowel op het vasteland als op de eilanden. Daarnaast is hij tamelijk verbreid in bosachtige gebieden in het oosten en zuiden van het land en zelfs hier en daar in het noorden, vooral op zandgronden. Maar bovendien blijkt *fluxa* nogal voor te komen in het Fluviatiel District en daar plaatselijk zelfs niet al te zeldzaam te zijn.

De vliegtijd kan al in de eerste week van juni beginnen en voortduren tot in de tweede week van september. De uiterste data zijn nu: 5.VI (HUISMAN) tot 11.IX (in 1963 te Hellevoetsluis, LEFFEF).

Vindplaatsen. Fr.: Schiermonnikoog (STOBBE), Ameland (CAMPING), Terschelling (talrijk, TANIS), Vlieland (gewoon, CAMPING), Oosterwolde, Oude Mirdum. Dr.: Schoonlo. Ov.: Abdij Sion, Deventer. Gdl.: Gorssel, de Voorst, Zutfen, Aalten, Babberich; Slijk-Ewijk. N.H.: 's-Graveland, Schoorl, Bergen, Castricum, Bakkum, Heemskerk, Beverwijk, Heemstede. Z.H.: Leiden, Meijendel, Staelduin, Schelluinen, Arkel, Spijk, Hendrik-Ido-Ambacht, Oostvoorne, Hellevoetsluis, Goedereede. Zl.: Haamstede, Westenschouwen, Oostkapelle, Valkenisse, Goes, Cadzand. Lbg.: Griendsveen, Sevenum, Tegelen, Swalmen, Montfort, Valkenburg, Epen.

Variabiliteit. Afgezien van een paar extreme vormen komt de soort bij ons in drie kleurtypen voor: een licht roodachtige of roodbruinachtige (de typische), een bleke witachtige (f. *hellmanni*) en een grijsachtige (f. *pulverosa*).

In de duinen overheerst f. *hellmanni,* maar op alle vindplaatsen kunnen ook de beide andere vormen aangetroffen worden. Ook in het binnenland komt f. *hellmanni* over het algemeen het meest voor, al is het percentage typische exemplaren in de regel groter. In 1960 werden in de vanglamp van de Plantenziektenkundige Dienst te Slijk-Ewijk 7 stuks van de typische vorm aangetroffen, tegen 17 *hellmanni,* 3 *saturata* en 7 *pulverosa* (van de Pol). Overigens blijken de exemplaren van deze niet geselecteerde serie duidelijk forser van bouw dan de gemiddelde dieren uit het duingebied. Enkele zijn zelfs ware reuzen. Zie plaat 15 fig. 5—10. Genitaalonderzoek leverde echter geen enkel punt van verschil met de kleinere duindieren op.

f. *saturata* Staudinger, 1871. Een extreme kleurvorm van de typische *fluxa* met donker bruinachtige voorvleugels. Zeldzaam. Slijk-Ewijk (van de Pol); Heemskerk (van Aartsen, in Zoöl. Mus.); Oostvoorne (Lucas).

f. *pallida* Lucas, 1959, *Ent. Ber.* 19: 205. Voorvleugels eenkleurig wit. Van de anders altijd zichtbare niervlek (een uitstekend kenmerk om de soort te determineren) is nauwelijks meer iets te zien. Natuurlijk niet te verwarren met afgevlogen exemplaren van f. *hellmanni.* Vlieland (Aukema); Twello, Heemstede (Zoöl. Mus.); Meijendel (Lucas).

f. *pulverosa* Warren, 1911. Vrij zeldzaam, maar vermoedelijk wel haast overal onder de soort aan te treffen, zoals uit de volgende lijst van nieuwe vindplaatsen blijkt: Vlieland (Camping); Abdij Sion (Flint); Slijk-Ewijk (van de Pol); Egmond aan Zee, Heemskerk, Burgh, Valkenisse (Zoöl. Mus.); Bakkum (Aukema); Aerdenhout, Wassenaar (van Wisselingh); Oostvoorne (Lucas).

Photeres pygmina Haworth. *Tijdschr. Entom.* 85: 72; Cat. VII: (399). De in 1943 aangegeven verbreiding is goed. Uit het grote aantal nieuwe vindplaatsen blijkt duidelijk, dat de vlinder in allerlei biotopen is aan te treffen, mits ze maar niet te droog zijn. Hij is nu van twee van de waddeneilanden bekend.

De vliegtijd kan voortduren tot in november. In 1963 werd nog op 9.XI een exemplaar aangetroffen in de Rivon-val te Burgh (Leffef). De uiterste nu bekende grenzen zijn dus: 20.VII—9.XI.

Vindplaatsen. Fr.: Terschelling, Vlieland, Sexbierum, Eernewoude, Bakkeveen, Beetsterzwaag, Oosterwolde, Fochtelo, Oldeberkoop, Wolvega, Nijetrijne, Oude Mirdum, Tjerkwerd. Gr.: Glimmen, Noordlaren, Borgercompagnie, Veendam. Dr.: Peize, Donderen, Assen, Eext, Schoonlo. Ov.: Volthe, Saasveld, Boekelo, Ommen, Boetelerveld, Abdij Sion, Zwartsluis, Kalenberg, Vollenhove. Flevoland: Lelystad. Gdl.: Ermelo, Wiessel, Terwolde, Uchelen, Empe, Otterlo, Arnhem, Wageningen, Bennekom, Lunteren; Gorssel, Eefde, Laren, Ruurlo, Neede, Korenburgerveen, Winterswijk, Hoog-Keppel, Babberich, Groessen: Slijk-Ewijk. Utr.: Amerongen, Zeist, Bilthoven. N.H.: 's-Graveland, Kortenhoef, Naarden, Naardermeer, Weesp, Amsterdamse Bos (gewoon, Peerdeman), Halfweg, Nek, Hoorn, Schoorl, Egmond aan Zee, Heemskerk, Aerdenhout, Heemstede. Z.H.: Noorden, Woerdense Verlaat, Reeuwijk, Leiden, Meijendel, Vlaardingen, Schelluinen, Gorkum, Arkel, Oostvoorne, Hellevoetsluis, Hendrik-Ido-Ambacht, Dirksland, Melissant, Ouddorp. Zl.: Haamstede, Burgh, Westenschouwen, Oostkapelle, Valkenisse, Goes, Cadzand. N.B.: Hoogerheide, Hilvarenbeek, Waalwijk, Vught, Sint Michielsgestel, Haaren, Kampina, Boxtel, Best, Oirschot, Bergeijk, Eindhoven, Nuenen, Geldrop, Leende, Asten, Helenaveen, Sint Anthonis, Gassel. Lbg.: Sevenum, Griendsveen, Tegelen, Swalmen, Sint Odiliënberg, Montfort, Stein, Brunssum, Valkenburg, Gronsveld, Epen, Vijlen.

Variabiliteit. De typische vorm met roseachtige voorvleugels, waarover soms een prachtige lila gloed ligt, is gewoon.

f. *concolor* Tutt, 1888. De vorm met witachtige voorvleugels is niet gewoon. Nieuwe vindplaatsen: Tjerkwerd (MULDER); Paterswolde (VAN WISSELINGH); Noordlaren, Heemstede (VAN DE POL); Boetelerveld (FLINT); Albergen (VAN DER MEULEN); Zeist, Hilversum (GORTER); Hendrik-Ido-Ambacht (BOGAARD).

f. *pallida* Stephens, 1829. De vorm met witachtig gele voorvleugels komt blijkens de uitgebreide serie in het Zoöl. Mus. het meest voor.

f. *ochracea* Tutt, 1891. De vorm met helder geelachtige voorvleugels is veel zeldzamer. Nieuwe vindplaatsen: Eernewoude (CAMPING); Aalten (VAN GALEN); Kortenhoef, Amsterdam, Halfweg (Zoöl. Mus.); Rotterdam (LUCAS).

f. *punicea* Tutt, 1888. Exemplaren met lichtgrijze iets rose getinte voorvleugels zijn niet al te zeldzaam en waarschijnlijk wel in elke flinke serie aan te treffen.

f. *punicea-suffusa* Tutt, 1888. Exemplaren met dezelfde grondkleur, maar met donkere bestuiving langs de aderen, zijn evenmin schaars. Scherp is de grens tussen beide laatstgenoemde vormen uiteraard niet.

f. *fulva* Hübner, [1809—1813]. De vorm met helder roodbruine tot bruinachtige voorvleugels is blijkens het thans aanwezige materiaal een van de gewoonste vormen, gewoner dan de typische, maar wat minder dan f. *pallida*.

[f. *neurica* Stephens, 1829, kan beter ingetrokken worden. Ten eerste berust de naam op een verkeerde determinatie en ten tweede kunnen de als zodanig gedetermineerde exemplaren zonder bezwaar tot f. *fulva* gerekend worden.]

f. *fusca* Lempke, 1943. De vorm met sterk verdonkerde voorvleugels, maar vrijwel normale achtervleugels, werd nog aangetroffen te Best (VAN AARTSEN, in Zoöl. Mus.).

f. **nervosa** nov. Voorvleugels met zwarte aderen. Abdij Sion, ♂, 18.IX.1963 (holotype, FLINT); Glimmen, Wageningen (VAN DE POL); Amsterdamse Bos (PEERDEMAN).

[Fore wings with black nervures.]

f. **nigrescens** nov. Voorvleugels roodachtig zwart, achtervleugels zwartachtig. Volthe (VAN DER MEULEN); Abdij Sion, ♂, 10.IX.1964 (holotype, FLINT); Kalenberg, ♂, 1964 (AUKEMA).

[Fore wings blackish red, hind wings blackish.]

f. **bilinea** nov. Voorvleugels met volledige eerste en tweede dwarslijn. Assen, ♂, 10.IX.1953 (holotype, VAN DE POL).

[Fore wings with complete antemedian and postmedian.]

Photedes brevilinea Fenn. *Tijdschr. Entom.* 85: 76: Cat. VII: (403). Een van de raadselachtigste bestanddelen van onze vlinderfauna. Behalve de oorspronkelijke vindplaats op Texel is nu een tweede in het centrum van Friesland bekend, waar de vlinder beslist inheems is en althans in goede jaren stellig geen zeldzaamheid genoemd kan worden. Maar overigens heeft geen enkele vanglamp in moerassige gebieden een spoor van *brevilinea* kunnen doen ontdekken. Noch de Rivon-lamp,

die in 1963 en 1964 te Nijetrijne brandde, noch de val, die door hetzelfde instituut in 1964 te Kalenberg geplaatst was (zo op het oog toch twee ideale gebieden voor de soort) leverde een enkel exemplaar van deze rietuil op.

Uit de omringende gebieden zijn weinig nieuwe gegevens bekend geworden. Alleen de Worms meldt de vangst van *brevilinea* te Lowestoft in 1950 (*Entomologist* 84: 148, 1951). (Behalve in Engeland en Nederland is *brevilinea* ook gevangen in Frankrijk (Epannes, dep. Deux-Sèvres); zie Lhomme, Catalogue, p. 286).

Volgens de nu bekende gegevens vliegt de vlinder bij ons van de tweede helft van juli tot de tweede helft van augustus. De uiterste data zijn nu: 21.VII—24.VIII.

Vindplaats. Fr.: Eernewoude (Camping trof de vlinder hier voor het eerst aan in 1953. Zie *Ent. Ber.* 15: 192, 1954).

Variabiliteit. f. *sinelinea* Farn, 1878, *Entomologist* 9: 103. De zwarte wortelstreep op de bovenzijde van de voorvleugels ontbreekt. Eernewoude, geregeld onder de soort (Camping etc.).

f. **depunctata** nov. Op de bovenzijde van de voorvleugels ontbreekt de rij postdiscale zwarte stippen. Eernewoude, ♂, 8.VIII.1957 (holotype, Zoöl. Mus.).

[The row of postdiscal points on the upper side of the fore wing is absent.]

f. *rufescens* Edelsten, 1902, *Ent. Rec.* 14: 103. Grondkleur van de voorvleugels roodachtig. Eernewoude (Zoöl. Mus.).

Eremobia Stephens

Eremobia ochroleuca Schiff. *Tijdschr. Entom.* 85: 122; Cat. VII: (449). Over het algemeen een schaarse soort, die vrijwel geheel beperkt is tot de zandgronden in het noorden, oosten en zuiden van het land. In het westen is geen enkele nieuwe vindplaats bekend geworden.

Geen correctie op de vliegtijd, die dus blijft: 6.VII—22.VIII.

Vindplaatsen. Ov.: Holten. Gdl.: Epe, Wolfheze; Eibergen, Korenburgerveen, Halle, Didam, Babberich. Utr.: Leersum. N.B.: Oosterhout, Hilvarenbeek, Kampina, Vught, Best, Nuenen, Bergeijk, Sint Anthonis. Lbg.: Swalmen, Sint Odiliënberg, Herkenbosch, Stramproy, Montfort, Echt, Welterberg, Hulsberg, Eijs, Wijlre.

Luperina Boisduval

Luperina testacea Schiff. *Tijdschr. Entom.* 85: 120; Cat. VII: (447). Geen nieuwe gegevens over de verspreiding en evenmin over de vliegtijd, waarvan de uiterste data dus blijven: 18.VII—5.X.

Variabiliteit. De f. *gueneei* Doubleday moet vervallen, daar hij niet tot deze soort behoort, maar tot de niet uit ons land bekende *Luperina nickerlii* Freyer.

f. **albescens** nov. Voorvleugels witachtig, alleen langs de voorrand donkerder. Glimmen, ♀, 3.IX.1960 (holotype, van de Pol).

[Fore wings whitish, only darker along the costa.]

f. *ochreo-pallida* Culot, 1909—1913. Exemplaren met licht geelbruine voor-

vleugels komen weinig voor. Nieuwe vindplaatsen: Middelie (DE BOER); Amstenrade (LUCAS).

f. *cinerea* Tutt, 1889. Exemplaren met lichtgrijze voorvleugels zijn gewoon.

f. *obscura* Culot, 1909—1913. Exemplaren met donkerbruine voorvleugels zijn zeer gewoon.

f. *nigrescens* Tutt, 1889. Exemplaren met zwartachtige voorvleugels komen onder het oudere materiaal nauwelijks voor. Daarentegen worden ze onder het moderne steeds meer aangetroffen. In het Zoöl. Mus. bevinden zich op het ogenblik alleen exemplaren van Otterlo, Halfweg, Heemskerk en Oostkapelle (alle VAN AARTSEN leg.). Verder zag ik er van Glimmen, Noordlaren, Lelystad, Bennekom, Groessen, Gassel (VAN DE POL); Wiessel (LUCAS); Zeist (GORTER); Amsterdam (PEERDEMAN); Melissant (HUISMAN).

f. *bicolor* Culot, 1909—1913. Exemplaren, waarbij het middenveld donker afsteekt tegen de rest van de voorvleugels, werden nog bekend van Apeldoorn (LEFFEF, in Zoöl. Mus.); Zeist (GORTER); Den Helder, Noorden (LUCAS); Leidschendam (Zoöl. Mus.).

f. *obsoleta* Tutt, 1889. Exemplaren met zeer flauwe tekening komen bij diverse kleurvormen voor. Het lijkt me het beste ze alle tot f. *obsoleta* te rekenen. Berkel (VLUG).

f. *lunato-strigata* Haworth, 1809. Overal onder de soort aan te treffen.

f. **albifasciata** nov. Gewaterde band witachtig, duidelijk afstekend tegen de rest van de voorvleugels. Abdij Sion, ♀, 1963 (FLINT); Amsterdam, ♂, 19.IX.1956 (holotype, PEERDEMAN).

[Submarginal band of the fore wings whitish, distinctly contrasting with the rest of the wings.]

f. **marginata** nov. Franjeveld van de voorvleugels sterk verdonkerd, scherp afstekend. Zeist, ♂, 2.IX.1953 (holotype, GORTER).

[Marginal area of the fore wings strongly darkened, sharply contrasting.]

f. *x-notata* Haworth, 1809. De vorm met x-vormige verbindingsstreep tussen eerste en tweede dwarslijn komt niet veel voor. Nieuwe vindplaatsen: Zeist (GORTER); Heemskerk (VAN AARTSEN, in Zoöl. Mus.).

f. *juncta* Lempke, 1943. Geen nieuwe vangsten bekend.

f. *semiconfluens* Lempke, 1943. Voor deze vorm geldt hetzelfde.

f. **clausa** nov. De eerste en tweede dwarslijn raken elkaar aan de binnenrand van de voorvleugels. Apeldoorn, ♂, 20.VIII.1954 (holotype, LEFFEF, in Zoöl. Mus.); Zeist (GORTER).

[The antemedian and the postmedian touch each other on the inner margin of the fore wings.]

f. **nigrolineata** nov. Voorvleugels (bij het holotype) licht bruingrijs; eerste en tweede dwarslijn en omranding van de tapvlek diep zwart, scherp afstekend. Zeist, ♂, 21.VIII.1955 (holotype, GORTER).

[Fore wings (with the holotype) pale brown-grey, antemedian, postmedian and the circumscription of the claviform deep black, sharply contrasting.]

Dwergen. Bij deze soort vrij gewoon.

Teratologisch exemplaar. Linker achtervleugel te klein. Bennekom (VAN DE POL).

Luperina zollikoferi Freyer. *Tijdschr. Entom.* 95: 279; Cat. XI: (890). Een van de grootste zeldzaamheden onder de Westeuropese immigranten. Na het reeds vermelde exemplaar, dat in 1949 te Zeist gevangen werd door GORTER, is dan ook geen tweede uit ons land bekend geworden.

Een voortreffelijk artikel over de soort publiceerde WARNECKE in *Z. Wiener ent. Ges.* 44: 101—108, 1959. Hij kwam na een uitvoerige studie van de literatuur tot het resultaat, dat van 1834 tot 1949 in geheel Midden- en Noord-Europa in totaal 54 exemplaren gevangen zijn, waarvan slechts vijf in het zuidelijke gedeelte van Midden-Europa. De vlinder is waarschijnlijk de enige immigrant, die vanuit Oost-Europa westwaarts trekt.

Amphipoea Billberg

Amphipoea oculea L. *Tijdschr. Entom.* 85: 108; Cat. VII: (435). Hoewel de vlinder inderdaad vooral verbreid is op onze zandgronden, is hij toch beslist niet zo sterk aan zulke terreinen gebonden als ik in 1943 schreef. Inmiddels zijn verscheidene vindplaatsen in het Hafdistrict en het Fluviatiel District bekend geworden, die voor een deel misschien zwervers betreffen, maar waarschijnlijk toch niet alle.

Behalve van Rottum is *oculea* nu van alle waddeneilanden gemeld.

De vliegtijd kan al de eerste week van juli beginnen en tot het eind van de eerste oktober-decade voortduren. De uiterste data zijn nu: 4.VII (in 1959, LUCAS) tot 8.X (in 1962, LEFFEF).

Vindplaatsen. Fr.: Ameland, Terschelling (talrijk, TANIS), Vlieland (gewoon, CAMPING), Sexbierum, 1962 en 1963 (STOBBE), Leeuwarden, Tietjerk, Oosterwolde, Fochtelo, Nijetrijne, Rijs. Gr.: Zevenhuizen (Leek), Glimmen, Noordlaren, Veendam. Dr.: Peizerveen, Peize, Westervelde, Zuidlaren, Grollo, Hooghalen, Vledder, Havelte. Ov.: Losser, Rutbeke, Lonneker, Volthe, Saasveld, Rectum, Boekelo, Delden, Elzen, Holten, Nijverdal, Raalte, Abdij Sion, Frieswijk, Colmschate, Steenwijkerwold. Gdl.: Harderwijk, Vierhouten, Epe, Nieuw-Millingen, Kootwijk, Wiessel, Hoog-Soeren, Assel, Hoog-Buurlo, Uchelen, Beekbergen, Wilp, Empe, Wolfheze, Otterlo, Harskamp, Lunteren; Gorssel, Eefde, Warnsveld, de Velhorst, Neede, Wientjesvoort, Winterswijk, Bredevoort, Hoog-Keppel, Didam, Babberich, Groesbeek; Ingen. Utr.: Doorn, Maarssen, Maartensdijk, Loosdrecht. N.H.: 's-Graveland, Blaricum, Naardermeer, Amsterdamse Bos (weinig, PEERDEMAN), Zaandam, Kwadijk, Oosthuizen, Hoorn, De Cocksdorp, Schoorl, Bergen, Castricum, Bakkum, Heemskerk, Overveen, Aerdenhout, Heemstede, Vogelenzang. Z.H.: Noordwijkerhout, Oegstgeest, Leiden, Wassenaar, Meijendel, Voorschoten, Staelduin, Arkel, Sliedrecht, Hendrik-Ido-Ambacht, Oostvoorne, Melissant, Goedereede, Ouddorp. Zl.: Burgh, Haamstede, Westenschouwen. N.B.: Hoogerheide, Oosterhout, Waalwijk, Nieuwkuik, Haaren, Kampina, Best, Bergeijk, Eindhoven, Nuenen, Helenaveen. Lbg.: Milsbeek, Griendsveen, Sevenum, Swalmen, Montfort, Stein, Heerlerheide, Ransdaal, Geulem, Geulle, Gronsveld, Camerig, Vijlen, Vaals.

Variabiliteit. Wat in 1943 over de geografische variabiliteit werd geschreven, moet wel grotendeels herzien worden. Dat in het oosten van ons land twee subspecies door elkaar zouden voorkomen, is onmogelijk. Al onze populaties behoren tot de nominaatvorm, die dus in grootte kan variëren, zoals ook al blijkt uit de afmetingen, die in „Svenska Fjärilar" voor de Zweedse exemplaren worden opgegeven.

De infrasubspecifieke variabiliteit is vrij groot, zoals al te zien was uit de tekst van 1943.

f. *auricula* Donovan, 1807. Exemplaren met volle gele niervlek zijn zeldzaamheden. Nieuwe vindplaatsen: Vlieland, Havelte (CAMPING); Velp (DE ROO); Apeldoorn, Oostvoorne (LUCAS); Bussum (VÁRI); Vught (VERHAAK); Epen (VAN WISSELINGH).

f. *erythrostigma* Haworth, 1809. Exemplaren met normaal roodbruine voorvleugels en geheel oranjerode niervlek zijn eveneens vrij zeldzaam, al komen ze blijkbaar wel op de meeste plaatsen onder de soort voor. Nieuwe vindplaatsen zijn: Vlieland (CAMPING); Oosterwolde (VAN RANDEN); Blaricum (BERGMAN); Aerdenhout, Wassenaar (VAN WISSELINGH); Oegstgeest (KAIJADOE); Oostvoorne (LUCAS); Melissant (HUISMAN); Burgh (WILMINK).

f. *obscura* Tutt, 1888. De vorm met zeer donker roodbruine voorvleugels en witte niervlek is practisch overal onder de soort aan te treffen, getuige de zeer lange serie vindplaatsen, die ik ervan ken.

f. *obscura-flavo* Tutt, 1891. De donkere vorm met gele niervlek is natuurlijk een zeldzaamheid. Nog bekend geworden van Vlieland (CAMPING); Meijendel, Oostvoorne (LUCAS).

f. *obscura-rufo* Tutt, 1891. Dezelfde vorm met oranjerode niervlek werd nog aangetroffen te Hoogerheide (KORRINGA).

f. *rosea* Tutt, 1888. De vorm met licht roodachtige voorvleugels en witte niervlek is niet gewoon. Nieuwe vindplaatsen: Vlieland (CAMPING); Peizerveen (VAN NIDEK); Veenhuizen, Gorssel, Hollandse Rading (Zoöl. Mus.); Bussum (TER LAAG); Leiden (LUCAS).

f. *rosea-flavo* Tutt, 1891, Brit. Noct. 1: 60. Dezelfde vorm met gele niervlek werd aangetroffen te Hoogerheide (KORRINGA).

f. *pallida* Tutt, 1888. De vorm met licht geelachtig rode voorvleugels en witte niervlek is vrij zeldzaam. Nieuwe vindplaatsen: Terschelling, Oostvoorne (LUCAS); Vlieland (CAMPING); Boekelo (VON HERWARTH); Blaricum (BERGMAN); Bussum (Zoöl. Mus.).

f. *pallida-flavo* Tutt, 1891. Dezelfde vorm met gele niervlek werd gevangen te Vlieland (CAMPING); Oostvoorne (LUCAS).

f. *pallida-rufo* Tutt, 1891. Dezelfde vorm, maar met oranjerode niervlek, werd aangetroffen te: Bussum (Zoöl. Mus.); Oostvoorne (LUCAS).

f. *grisea* Lempke, 1943. De vorm met vuil geelachtig grijze voorvleugels en witte niervlek is toch niet al te zeldzaam blijkens het aantal nieuwe vindplaatsen: Terschelling, Meijendel, Oostvoorne (LUCAS); Vlieland (CAMPING); Oosterwolde (VAN RANDEN); Hoog-Soeren (LEFFEF); Apeldoorn, Hollandse Rading, 's-Graveland, Bussum, Heemskerk (Zoöl. Mus.); Bakkum (DE BOER); Overveen (ALDERS); Aerdenhout (VAN WISSELINGH); Goedereede (HUISMAN); Burgh (WILMINK).

Ook met oranje vlek komt deze kleurvorm voor: Vlieland (CAMPING); Noordlaren (VAN DE POL).

f. *aurigera* Heydemann, 1932. Geen nieuwe vindplaatsen bekend.

Dwergen. Vlieland (CAMPING); Raalte (FLINT); Hatert, Zeist (GORTER); Hollandse Rading, 's-Graveland (Zoöl. Mus.).

Amphipoea fucosa Freyer. *Tijdschr. Entom.* 85: 111; Cat. VII: (438). Blijkens het nu bekende grote aantal vindplaatsen een in vele delen van het land voorkomende vlinder, die over het algemeen wel meer op vochtiger terreinen voorkomt dan *oculea,* maar toch ook op drogere plaatsen is aan te treffen. Vaak is *fucosa* de dominerende soort, behalve in de regel op te droge gronden. Hier is *oculea* meestal in de meerderheid. In het duingebied echter is dit weer niet het geval. Daar is *fucosa* (althans plaatselijk) veel gewoner. Met uitzondering van Ameland en Rottum is de vlinder nu van alle waddeneilanden bekend.

De vliegtijd kan tot begin oktober duren. De uiterste data worden nu: 1.VII—2.X. De late datum werd in 1962 door HUISMAN te Melissant genoteerd.

V i n d p l a a t s e n. Fr.: Terschelling (gewoon, TANIS), Vlieland (vrij gewoon, maar minder dan *oculea,* CAMPING), Leeuwarden, Oosterwolde, Fochtelo (verreweg de gewoonste van de drie verwante soorten), Oldeberkoop, Nijetrijne (gewoon, LEFFEF), Tjerkwerd. Gr.: Zevenhuizen (Leek), Groningen, Appelbergen, Glimmen, Noordlaren, Veendam, Vlagtwedde. Dr.: Peizerveen, Peize, Steenbergen, Eext, Schoonlo, Odoorn, Emmen, Havelte. Ov.: Losser, Enschede, Volthe, Aadorp, Ommen, Raalte, Abdij Sion, Platvoet, Vollenhove, Marknesse. Flevoland: Lelystad. Gdl.: Garderbroek, Ermelo, Vierhouten, Wiessel, Hoog-Soeren, Apeldoorn, Uchelen, Beekbergen, Hoenderlo, Otterlo, Velp, Wolfheze, Renkum, Wageningen, Bennekom, Lunteren; Eefde, de Voorst, Warnsveld, Zutfen, Almen, Wientjesvoort, Neede, Winterswijk, Bredevoort, Halle, Didam, Babberich, Wehl, Loerbeek; Slijk-Ewijk, Heteren. Utr.: Zeist, Amersfoort. N.H.: Blaricum, Naarden, Naardermeer, Weesp, Diemen, Amsterdamse Bos (weinig, PEERDEMAN), Zaandam, Middelie, Hoorn, de Cocksdorp, Groet, Schoorl, Egmond aan Zee, Castricum, Overveen, Heemstede, Aerdenhout. Z.H.: Staelduin, Vlaardingen, Vianen, Schelluinen, Sliedrecht, Hendrik-Ido-Ambacht, Pernis, Oostvoorne, Middelharnis, Melissant, Goedereede, Ouddorp. Zl.: Zierikzee, Nieuwerkerk-Sch., Haamstede, Westenschouwen, Burgsluis, Kats, Kamperland, Veere, Oostkapelle, Valkenisse, Groede, Cadzand. N.B.: Hoogerheide, Oosterhout, Waalwijk, Bergeijk, Eindhoven, Helenaveen, Sint Anthonis, Gassel. Lbg.: Plasmolen, Milsbeek, Castenraij, Griendsveen, Tegelen, Swalmen, Heel, Sint Odiliënberg, Posterholt, Herkenbosch, Montfort, Peij, Echterbos, Stein, Amstenrade, Bocholtz, Geulem, Epen, Vaals.

V a r i a b i l i t e i t. Bij deze soort zijn in ons land wel twee subspecies te onderscheiden. Waar ze elkaar raken, komen echter gemengde populaties voor.

Subsp. *paludis* Tutt, 1888. Deze is gekarakteriseerd door gemiddeld geringere grootte, het overheersen van vormen met geelachtige of grijsachtige voorvleugels en dus het procentueel veel geringere voorkomen van dieren met roodachtige voorvleugels. De niervlek varieert in breedte, precies als bij de andere ondersoort, al komen exemplaren met zeer smalle niervlek bij subsp. *paludis* meer voor dan bij subsp. *fucosa.* De mooiste populaties van subsp. *paludis* zag ik van Texel, Zaandam en Vlaardingen, terwijl zich in zeer korte tijd een sterke populatie in oostelijk Flevoland ontwikkelde. In het algemeen kunnen we zeggen, dat deze subsp. voorkomt in (een deel van) het Waddendistrict, het Hafdistrict en het westelijke deel van het Fluviatiel District.

Subsp. *fucosa* Freyer. Gemiddeld groter dan subsp. *paludis,* terwijl exemplaren met roodachtige voorvleugels overheersen. Het spreekt vanzelf, dat onder deze subsp. ook *paludis*-achtige exemplaren kunnen voorkomen. In flinke niet geselecteerde series is het verschil echter duidelijk.

[O b s e r v a t i o n. Subsp. *paludis* Tutt, described from salt marshes along the English coast, also occurs in the western part of the Netherlands. It is as a rule smaller than subsp.

fucosa Freyer, whereas specimens with greyish or yellowish fore wings dominate. A very fine population developed in a few years in the new Flevopolder (south-eastern part of the IJselmeer). It is probable that formerly the whole Doggerland was inhabited by this subspecies.

Subsp. *fucosa* Freyer is on the whole larger than subsp. *paludis*, whereas specimens with reddish fore wings dominate. It inhabits the higher and drier parts in the east and south of the Netherlands. Where both subspecies meet, populations with a mixed character result.]

Individueel varieert *fucosa* nog veel sterker dan *oculea* (en *lucens*). Het in 1943 gegeven overzicht van de in ons land aangetroffen vormen was nogal verward en kan vrij belangrijk vereenvoudigd worden. De verschillende kleuren van de niervlek kunnen bij elke tint van de grondkleur voorkomen. De naam *pallescens* Staudinger kan in geen geval voor een hier voorkomende kleurvorm gebruikt worden, daar het de naam is voor een subspecies uit Azië.

Alle exemplaren met licht geelbruine grondkleur (en oranjerode niervlek) kunnen tot de typische vorm gerekend worden. Deze is vrij gewoon.

f. *fucosa-alba* Heydemann, 1931. Dezelfde vorm, maar met witte niervlek, is nogal zeldzaam, maar komt toch vrij verbreid onder de soort voor, zelfs op de waddeneilanden en in het westen van het land (Terschelling, Vlaardingen, Westenschouwen).

f. *intermedia* Tutt, 1888. De vorm met donkerder geelbruine grondkleur van de voorvleugels is zeer gewoon met oranje niervlek (f. *intermedia-flavo* Tutt), iets minder talrijk, maar toch ook gewoon, met witte niervlek (f. *intermedia-albo* Tutt).

f. *grisea* Tutt, 1888. De vorm met vuil grijsgele voorvleugels is zowel met oranje (f. *grisea-flavo* Tutt) als met witte niervlek (f. *grisea-albo* Tutt) vooral bij subsp. *paludis* zeer gewoon.

f. *rufa* Tutt, 1895. De vorm met roodachtige voorvleugels is eveneens zeer gewoon, vooral bij subsp. *fucosa*, zowel met oranje (f. *rufa-flavo* Tutt) als met witte niervlek (f. *rufa-albo* Tutt).

f. *brunnea* Tutt, 1891. De vorm met bruinachtige voorvleugels (donkerder dan de vorige vorm) is gewoon, zowel met oranje als met witte niervlek (f. *brunnea-flavo* Tutt en f. *brunnea-albo* Tutt).

f. *obscura* Lempke, 1943. Exemplaren met zeer donker bruine voorvleugels zijn nogal zeldzaam. Oorspronkelijk beschreven met de achtervoeging *flavomaculata* voor dieren met gele of oranje niervlek, maar deze beperking kan vervallen. Nieuwe vindplaatsen: Vlieland (CAMPING); Oosterwolde (VAN RANDEN); Apeldoorn (LEFFEF, in Zoöl. Mus.); Lunteren (BRANGER); Slijk-Ewijk (VAN DE POL).

Met witte niervlek iets gewoner: Vlieland (CAMPING); Fochtelo (G. DIJKSTRA); Terschelling, Peize, Norg, Grollo, Wiessel, Westenschouwen, Oostkapelle, Echt (Zoöl. Mus.); Glimmen, Slijk-Ewijk (VAN DE POL); Aalten (VAN GALEN); Lobith (SCHOLTEN).

f. **nigrescens** nov. Grondkleur van de voorvleugels zwartachtig (variërend in tint), achtervleugels zwartachtig met fel afstekende lichte franje. Bennekom, ♀, 10.VIII.1956 (holotype, VAN DE POL); Goedereede (HUISMAN).

[Ground colour of the fore wings blackish (varying in tint), hind wings blackish with sharply contrasting pale fringe.]

f. *virgata* Cockayne, 1951, *Ent. Rec.* 63: 160. Op de bovenzijde van de voor-

vleugels is het middenveld donkerder dan de rest van de vleugels. Goedereede, 1960 (HUISMAN).

f. *obsoleta* Richardson, 1952, *Ent. Rec.* 64: 272. De ronde vlek en de niervlek zijn van dezelfde kleur als de grondkleur en sterk gereduceerd. Ik zou de naam willen gebruiken voor alle exemplaren, waarbij de niervlek niet meer afsteekt en nog vrijwel alleen zichtbaar is door de omranding ervan. Oosterwolde (VAN RANDEN); Fochtelo (CAMPING); Marknesse, Lelystad (VAN DE POL).

f. **nigrisignata** nov. Niervlek zwart geringd en in het midden met een zwarte lijn. Zaandam, ♂, 19.VIII.1963 (holotype, AUKEMA).

[Reniform with black circumscription and with black line in the centre.]

f. **trimaculata** nov. Ronde vlek licht, niervlek (bij het holotype) fel wit, tapvlek met volledige donkere omranding en lichte vulling. Odoorn, ♂, 24.VII.1957 (holotype, PEERDEMAN).

[Orbicular pale, reniform (with the holotype) pure white, claviform with complete dark circumscription and pale centre.]

Dwergen. Korenburgerveen (Zoöl. Mus.); Weesp (WESTERNENG); Melissant (HUISMAN); Brunssum (CLAASSENS).

S o m a t i s c h e m o z a i e k. Een ♂ van Steenbergen (Dr.), 1964 (BLOM), heeft op de linker voorvleugel een gele niervlek en op de rechter een oranjerode. Mogelijk behoort het tot deze groep van afwijkingen.

Amphipoea lucens Freyer. *Tijdschr. Entom.* 85: 115; Cat. VII: (442). De vlinder komt lokaal voor in de oostelijke helft van het land. Wat in 1943 over het biotoop geschreven werd, is juist gebleken. Toch vormen hoogvenen ongetwijfeld wel het optimale biotoop van de soort. In 1964 behoorde al het materiaal, dat LEFFEF in de Peel verzamelde, tot *lucens.* Maar in het Fochteloër veen bleek *fucosa* de overheersende soort te zijn! Van een serie, die ik in 1956 bij de heer G. DIJKSTRA van deze vindplaats zag, behoorden 58 exemplaren tot laatstgenoemde soort, slechts twee tot *lucens* en één tot *oculea.* Opmerkelijk is de vrij sterke verbreiding in het Drentse District. Zie overigens ook de verspreidingskaart, fig. 43.

In België is *lucens* nog steeds niet aangetroffen. De soort werd wel vermeld in *Lambillionea* 59: 55—56 (1959) van enkele vindplaatsen, maar deze opgave bleek toch op een onjuiste determinatie te berusten (*Linn. Belg.* 1: 57, 1960). Gemiddeld is *lucens* de meest forse soort van de drie, maar er komen ook ware dwergen voor, die kleiner zijn dan een normale *fucosa.* Door middel van een genitaalpreparaat is *lucens* echter heel makkelijk met zekerheid te onderscheiden, zoals reeds uiteengezet is in Cat. VII. Vooral het kleine bundeltje dorentjes aan het uiteinde van de cucullus is bij de mannetjes al een biezonder eenvoudig kenmerk.

In de nieuwe editie van „SOUTH" (Moths 1: 310, 1961) wordt *lucens* opgegeven van drie graafschappen in het midden en noorden van Engeland, van Schotland, het eiland Skye (het grootste van de binnenrij der Hebriden) en van Ierland (hier gewoon).

De vliegtijd kan tot de tweede helft van september duren. De uiterste data zijn nu: 18.VII—22.IX. De hoofdvliegtijd is augustus.

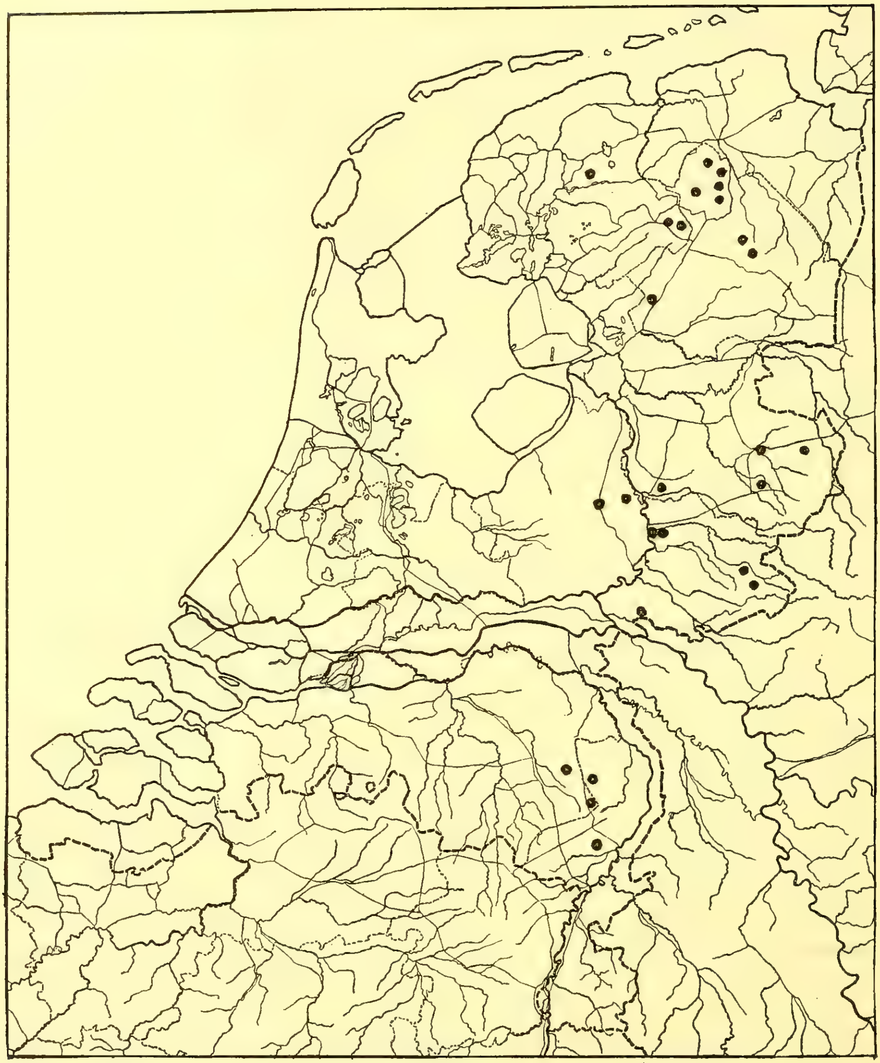


Fig. 43. Verbreiding van *Amphipoea lucens* Freyer in Nederland

Vindplaatsen. Fr.: Eernewoude, Oosterwolde, Fochtelo. Dr.: Peize, Eelde, Donderen, Westervelde, Norg, Grollo, Schoonoord, Havelte. Ov.: Volthe, Almelo, Delden. Gdl.: Apeldoorn; Warnsveld, Zutfen, Korenburgerveen. N.B.: Helenaveen. Lbg.: Griendsveen, Roggel.

Variabiliteit. De typische vorm heeft roodbruine voorvleugels met oranjerode niervlek. Blijkens de serie in het Zoöl. Mus. is deze niet gewoon, maar komt wel overal onder de soort voor.

f. *lucens-flavo* Tutt, 1891. Roodbruine exemplaren met gele niervlek zag ik van Fochtelo (DIJKSTRA).

f. *lucens-albo* Tutt, 1891. Roodbruine exemplaren met witte niervlek: Fochtelo

(CAMPING); Peize (WILMINK); Korenburgerveen, Helenaveen (Zoöl. Mus.).

f. *rufa* Tutt, 1891, Brit. Noct. 1: 62. Grondkleur van de voorvleugels helder rood. Deze kleurvorm met roodbruine niervlek is de gewoonste bij ons.

f. *rufa-albo* Tutt, 1891, l. c. Dezelfde vorm met witte niervlek is veel zeldzamer. Schoonoord, Twello, Korenburgerveen (Zoöl. Mus.).

f. *grisea* Tutt, 1891, l. c. Grondkleur van de voorvleugels grijsachtig okerkleurig, middenveld iets roodachtig. Exemplaren met gele niervlek (f. *grisea-flavo* Tutt) van Volthe (VAN DER MEULEN) en Griendsveen (LEFFEF, in Zoöl. Mus.).

Exemplaren met witte niervlek (f. *grisea-albo* Tutt) van Fochtelo, Eelde, Norg, Griendsveen (Zoöl. Mus.) en Volthe (VAN DER MEULEN).

f. *brunnea* Tutt, 1895. Exemplaren met bruinachtige duidelijk okerachtig getinte voorvleugels, dus vrij licht. Met roodbruine niervlek (f. *brunnea-rufo* Tutt, 1895) van Peize (WILMINK); Twello, Groenlo (Zoöl. Mus.).

Met gele niervlek (*brunnea-flavo* Tutt, 1895) van Norg (Zoöl. Mus.); Volthe (VAN DER MEULEN); Zutfen (WILMINK).

Met witte niervlek (f. *brunnea-albo* Tutt, 1895) van Havelte, Almelo (VAN DER MEULEN); Apeldoorn, Twello (Zoöl. Mus.).

f. *castanea* Lempke, 1943. Exemplaren met diepbruine voorvleugels. Met roodbruine niervlek van Fochtelo, Apeldoorn, Grollo, Helenaveen (Zoöl. Mus.); Eernewoude (CAMPING).

Met gele niervlek (waartoe ook het holotype behoorde) van Fochtelo (DIJKSTRA); Peize, Warnsveld (WILMINK); Grollo, Korenburgerveen, Helenaveen (Zoöl. Mus.).

Met witte niervlek van Grollo, Helenaveen (LEFFEF, in Zoöl. Mus.); Volthe (VAN DER MEULEN).

Dwerg. Griendsveen (LEFFEF, in Zoöl. Mus.).

Hydraecia Guenée

Hydraecia micacea Esper. *Tijdschr. Entom.* 85: 119; Cat. VII: (446). Een aanvulling van de reeds gepubliceerde lijst van vindplaatsen zou te lang worden. Waar in de vliegtijd ook maar verzameld werd, ving men *micacea.* Niet overal echter is de soort even gewoon. Hij heeft duidelijk een voorkeur voor niet te droge gebieden. Zeer opvallend is het grote aantal vindplaatsen in het noorden van het land, terwijl dit gebied faunistisch toch vrij slecht bekend is. Wat de waddeneilanden betreft, is *micacea* nu bekend van Texel, Terschelling en Ameland.

De vliegtijd kan iets eerder beginnen dan in 1943 bekend was. De uiterste data zijn nu: 4.VII—6.XI. De vroege datum werd in 1959 genoteerd door LUCAS.

V a r i a b i l i t e i t. De meeste exemplaren behoren tot de typische vorm met min of meer roodbruine voorvleugels, die duidelijk getekend zijn.

f. *grisea* Tutt, 1888. Exemplaren met lichtgrijze zwak getekende voorvleugels komen niet veel voor. Twello, Weesp, Halfweg (Zoöl. Mus.); Nijmegen (VAN WISSELINGH).

f. *discolor* Kroulikovsky, 1894. Exemplaren met groenachtig grijze voorvleugels zijn gewoon en komen overal onder de soort voor.

f. *lutea* Tutt, 1888. Exemplaren met licht roodachtig gele voorvleugels en licht

geelachtige zwak getekende achtervleugels komen weinig voor. Glimmen (VAN DE POL); Amsterdamse Bos (PEERDEMAN).

f. *cypriaca* Haworth, 1809. Exemplaren met licht roodachtige voorvleugels zijn niet gewoon. Nieuwe vindplaatsen: Apeldoorn, Halfweg, Numansdorp (Zoöl. Mus.); Amsterdamse Bos (PEERDEMAN); Haarlem (VAN WISSELINGH).

f. *rubida* Tutt, 1888. Exemplaren met diep rode, soms iets purper getinte voorvleugels komen wat meer voor, maar zijn toch niet gewoon. Nieuwe vindplaatsen: Leeuwarden (CAMPING); Vollenhove, Halfweg, Numansdorp, Valkenisse, Best (Zoöl. Mus.); Groessen (VAN DE POL); Weesp (VAN TUIJL); Hendrik-Ido-Ambacht (BOGAARD).

f. *brunnea* Tutt, 1888. Exemplaren met diep bruine voorvleugels, waarvan de grondkleur vaak sterk doet denken aan die van *Hydraecia petasitis,* zijn gewoon.

f. *plumbosa* Heslop-Harrison, 1929, *Vasculum* 15: 39. Grondkleur van de voorvleugels zwartachtig (-bruin, -grijs). Volgens de oorspronkelijke beschrijving dof loodkleurig, maar het lijkt me het verstandigste alle melanistisch gekleurde exemplaren onder één naam te verenigen. Dieren met zwartachtige voorvleugels zijn (nog) zeldzaam. Borgercompagnie, Valkenisse (Zoöl. Mus.); Beemster (HUISENGA); Aerdenhout (VAN WISSELINGH).

f. **virgata** nov. Voorvleugels met volledige donkere middenband, die duidelijk afsteekt tegen het lichtere wortelveld en achterrandsveld. Lelystad, ♀, 12.IX.1961 (holotype, VAN DE POL).

[Fore wings with complete dark central band, which clearly contrasts with the basal and marginal areas.]

f. *intacta* Warren, 1911. Exemplaren met licht roodachtig bruine voorvleugels en geelachtige ongetekende achtervleugels werden nog aangetroffen te Voerendaal (Zoöl. Mus.).

f. *trilinea* Hoffmeyer, 1958. *Flora og Fauna* 64: 15, fig. 3. Voorvleugels met duidelijke middenschaduw. Apeldoorn (LEFFEF leg., Zoöl. Mus.); Zeist (GORTER).

f. **nigrolineata** nov. Voorvleugels met zwarte eerste en tweede dwarslijn. Slijk-Ewijk, ♂, 31.VII.1960 (holotype, VAN DE POL).

[Fore wings with black antemedian and postmedian.]

f. **obsoleta** nov. Voorvleugels eenkleurig (bij het holotype roodachtig), met zeer zwakke tekening. Glimmen, ♂, 30.VII.1959 (holotype, VAN DE POL).

[Fore wings unicolorous, with the holotype reddish, markings obsolete.]

f. **semiconfluens** nov. Ronde vlek en niervlek smal met elkaar verbonden. Gassel, ♂, 2.IX.1957 (holotype, VAN DE POL).

[Orbicular and reniform connected by a narrow isthmus.]

f. *immaculata* Hoffmeyer, 1958, l. c.: 15, fig. 4. Tekening van de bovenzijde min of meer normaal, maar achtervleugels aan de onderzijde (en in dat geval ook altijd aan de bovenzijde) zonder discale vlek. Hilversum, Best (Zoöl. Mus.); Breda (Leids Mus.).

Dwergen. Bij deze soort opvallend gewoon, soms zeer kleine exemplaren.

Hydraecia petasitis Doubleday. De soort werd voor het eerst als inlands ver-

meld door LEFFEF (*Ent. Ber.* 16: 18, 1956), die in 1955 een exemplaar bij Apeldoorn ving. Later bleek echter, dat WILMINK reeds in 1946 de vlinder te Goes had gevangen. Maar ook dit is niet het eerste Nederlandse exemplaar. Want toen ik enige maanden geleden de serie van *Hydraecia micacea* in het Rijksmuseum van Natuurlijke Historie doornam, vond ik daarin tot mijn verrassing een wat afgevlogen, maar voor wie de soort eenmaal gezien heeft, onmiskenbaar exemplaar, dat reeds in 1902 te Dordrecht was gevangen! Het was afkomstig uit de collectie-DE JONCHEERE.

Sinds 1955 is *petasitis* op verscheidene plaatsen in het land aangetroffen, echter nog niet in de noordelijke provincies. Wegens het voorkomen van de voedselplant zal de vlinder wel altijd vrij lokaal blijven. Hoewel diverse exemplaren op licht gevangen zijn, ontkomt men bovendien niet aan de indruk, dat dit niet de ideale manier is om het dier in handen te krijgen. Mogelijk maakt zijn verblijf onder en tussen de grote hoog opschietende bladeren van het groot hoefblad, dat het licht daar geen effect heeft.

Het in vrij snel tempo bekend worden van nieuwe vindplaatsen wijst er op, dat *petasitis* bezig is zijn areaal uit te breiden. Ook het feit, dat slechts kort nadat Oostelijk Flevoland droog was, al een exemplaar te Lelystad op de lamp afkwam, die de Plantenziektenkundige Dienst hier opgesteld had, en vondsten ten oosten en zuiden van ons land duiden hierop.

De soort is eigenlijk het beste in handen te krijgen door te zoeken naar de rupsen. Uitvoerig heeft BOGAARD hierover bericht in *Ent. Ber.* 24: 42 (1964) en 25: 59 (1965). Zie ook VAN AARTSEN in *Ent. Ber.* 25: 109. Overigens is al wel gebleken, dat lang niet elke kolonie van groot hoefblad een populatie van de vlinder herbergt.

In Denemarken is *petasitis* bekend van Bornholm, Seeland, Funen en Jutland. HOFFMEYER schrijft uitvoerig over de vlinder in de tweede druk van zijn „Danske Ugler": 269—270 (1962). In de omgeving van Hamburg werd het dier voor het eerst in 1950 gevonden en ook daarna nog enige malen (*Bombus* 2: 74, 1958; *Mitt. faun. Arb.gemeinsch. Schleswig-Holstein, Hamburg u. Lübeck* (N.F.) 6: 63, 1953). Bij Bielefeld een ♂ in 1948. In Westfalen bij Hagen en Bochum. In België werd het eerste exemplaar in 1956 te Hal gevangen (*Linn. Belg.* 1: 3, 1958). (In Frankrijk werd *petasitis* voor het eerst in 1933 aangetroffen, zie BOURSIN, *Bull. Soc. ent. France* 1937: 9). Op de Britse eilanden is de vlinder bekend van enkele graafschappen in het midden van Zuid-Engeland, verder van Noord-Engeland, waar hij het gewoonst is, en van vindplaatsen in Schotland.

De thans bekende vliegtijd (van gevangen exemplaren) duurt van de tweede helft van juli tot begin september (24.VII—8.IX).

Vindplaatsen. Flevoland: Lelystad, 24.VII.1961, ♀ (VAN DE POL). Gdl.: Ermelo, 13.VIII.1963 (VAN DER MEULEN); Apeldoorn, 16.VIII.1955 en 2.IX.1961 (LEFFEF); Wageningen, ♀, 8.IX.1955 (Zoöl. Mus.); Lunteren, 25.VIII.1960 (BRANGER). Utr.: Zeist, ♂, 3.X.1956 (GORTER). N.H.: Diemen, rupsen in 1963 en 1964 talrijk, in 1965 veel minder (VAN AARTSEN). Z.H.: Ottoland, rupsen in 1963 (SLOB); Schelluinen, 30.VIII en 5.IX.1961 (idem); Spijk, 16 en 26.VIII.1964 (ZWAKHALS); Slikkerveer, 1963 en 1964 veel rupsen en poppen (BOGAARD); Hendrik-Ido-Ambacht, 24.VIII.1960 (idem); Dordrecht, 27.VIII.1902 (Leids Mus.), 8.IX.1963 (LUCAS). Zl.: Goes, 4.VIII.1946 (WILMINK). Lbg.: Schinnen, 11.VIII.1964 (DELNOYE en PENNERS).

Gortyna Ochsenheimer

Gortyna flavago Schiff. *Tijdschr. Entom.* 85: 107; Cat. VII: (434). Evenals *Hydraecia micacea* is ook deze soort over vrijwel het gehele land verbreid met een voorkeur voor niet al te droge streken. Vandaar ook weer het opvallend grote aantal vindplaatsen in het Hafdistrict en in een deel van het Fluviatiel District. De vlinder is nu van drie van de waddeneilanden bekend.

De vliegtijd kan al in juli beginnen, al is dat wel aan de zeer vroege kant. In het Leids Mus. bevindt zich een exemplaar, dat 9 juli 1950 te Leiden gevangen werd. De nu bekende uiterste data zijn dus: 9.VII—18.X.

Vindplaatsen. Fr.: Vlieland, Sexbierum, Sint Anna Parochie, Franeker, Leeuwarden, Eernewoude, Oosterwolde, Noordwolde, Nijetrijne, Oude Mirdum, Tjerkwerd. Gr.: Haren, Glimmen, Noordlaren, Borgercompagnie, Veendam, Vlagtwedde. Dr.: Paterswolde, Peize, Norg, Westervelde, Zuidvelde, Donderen, Zuidlaren, Eext, Assen, Grollo, Vledder. Ov.: Volthe, Saasveld, Almelo, Boekelo, Raalte, Abdij Sion, Colmschate, Zwolle, Zwartsluis, Vollenhove, Marknesse. Gdl.: Harderwijk, Wezep, Vaassen, Wiessel, Terwolde, Wageningen, Lunteren; de Voorst, Almen, Laren, Groessen; Ochten, Slijk-Ewijk, Neerijnen. Utr.: Cothen, Zeist, Hollandse Rading, Vinkeveen. N.H.: Blaricum, Bussum, Kortenhoef, Naardermeer, Muiden, Amsterdamse Bos (gewoon, Peerdeman), Halfweg, Zaandam, Purmerend, Middelie, Beemster, Hoorn, de Koog (Texel), Den Helder, Groet, Schoorl, Bergen, Alkmaar, Heemskerk, Velzen, Bloemendaal, Overveen, Aerdenhout, Heemstede. Z.H.: Woerdense Verlaat, Noorden, Oegstgeest, Meijendel, Voorschoten, Delft, Staelduin, Vlaardingen, Gouda, Schelluinen, Arkel, Hendrik-Ido-Ambacht, Barendrecht, Oostvoorne, Hellevoetsluis, Middelharnis, Melissant, Goedereede, Ouddorp. Zl.: Burgh, Haamstede, Westenschouwen, Oostkapelle, Valkenisse. N.B.: Bergen op Zoom, Waalwijk, Vught, Sint Michielsgestel, Haaren, Kampina, Oirschot, Best, Eindhoven, Geldrop, Helenaveen, Gassel. Lbg.: Velden, Swalmen, Heel, Montfort, Stein, Sittard, Heerlen, Geulem, Epen.

Variabiliteit. f. *ochracea* Hübner, 1786. Exemplaren met lichtgele grondkleur behoeven niet noodzakelijkerwijs dwergen te zijn, terwijl ook niet alle kleine exemplaren een lichte grondkleur hebben. De vorm is niet zeldzaam en is wel op de meeste plaatsen onder de soort aan te treffen.

f. *suffusa* Warren, 1911. Exemplaren, waarbij de voorvleugels roestkleurig bestoven zijn, komen minder voor. Nieuwe vindplaatsen: Franeker, Hatert, Rotterdam, Numansdorp (Zoöl. Mus.); Aerdenhout, Wassenaar (van Wisselingh).

f. **obscura** nov. Opvallend verdonkerde exemplaren. Thorax en de donkere delen van de voorvleugels donker paars, in het middenveld de donkere tekening sterker en donkerder dan normaal, in de donkere band voor de achterrand nog slechts een klein vlekje van de lichte grondkleur aan de voorrand; achtervleugels eveneens verdonkerd. Borgercompagnie, ♀, 20.IX.1962 (holotype), Heemskerk, ♀, 1963 (Zoöl. Mus.); Doorn (Van Der Aa).

[Strikingly darkened specimens. Thorax and the dark parts of the fore wings dark purplish, the dark markings in the central area stronger and darker than normal, in the dark submarginal band only a small costal spot of the pale ground colour; hind wings also darkened.]

f. *reducta* Lempke, 1943. Niet alleen ontbreekt de donkere basale band op de voorvleugels grotendeels, maar ook de donkere band voor de achterrand is gereduceerd: hij is veel smaller, zodat tussen deze band en de franje een doorlopende lichte band ontstaat, die doorsneden is door donkere aderen. Doorn (Van Der

AA); Den Helder, Wassenaar (LUCAS); Melissant (HUISMAN); Nuenen (NEIJTS); Deurne (NIES).

Dwergen. Vrij gewoon. Het is opvallend, dat bij soorten, waarvan de rupsen in plantedelen leven, kleine exemplaren veel meer voorkomen dan bij de andere soorten.

Calamia Hübner

Calamia tridens Hufnagel, 1766 (*virens* L., 1767). *Tijdschr. Entom.* 85: 79; Cat. VII: (406). De vlinder is een typische bewoner van droge gronden. Vooral heidegebieden met een tussenbegroeiing van grassen zijn een biotoop, waar hij thuis hoort. Opvallend is dan ook het grote aantal vindplaatsen op de Veluwe. Ook in het Duindistrict is *tridens* goed verbreid, maar is hier toch duidelijk schaarser dan op de zandgronden in het binnenland. In het Waddendistrict nu bekend van twee der eilanden, Terschelling en Texel.

Een paar maal is het dier ver buiten zijn normale biotoop aangetroffen. Waarschijnlijk betrof het dan zwervers.

Geen correctie op de vliegtijd, waarvan de uiterste data dus blijven: 17.VII—28.IX.

Vindplaatsen. Fr.: Terschelling (weinig, LEFFEF), Leeuwarden, in 1952 een exemplaar op licht (CAMPING), Appelsga. Gr.: Onnen, Vlagtwedde. Dr.: Norg, Zuidlaren, Gasteren, Ballo, Schoonlo, Odoorn, Holthaar (Ruinen), Havelte. Ov.: Ootmarsum, Volthe, Vasse, Albergen, Saasveld, Boekelo, Enter, de Borkeld (Markelo), Holten, Ommen, Vilsteren, Raalte, Klooster Sion, Frieswijk, Zwartsluis, 1962 (HARSEVOORD), Vollenhove. Flevoland: Lelystad. Gdl.: Hoevelaken, Voorthuizen, Ermelo, Harderwijk, Hulshorst, Vierhouten, Wezep, Epe, Vaassen, Wiessel, Leesten, Uchelen, Beekbergen, Voorst, Imbosch, Rheder heide, Terlet, Oud-Reemst, Hoenderlo, Otterlo, Kootwijkerveen, Ede, Lunteren; Eefde, Zutfen, Almen, Ruurlo, Neede, Kotten, Braamt (Zeddam), Babberich; Slijk-Ewijk. Utr.: De Klomp, Leersum, Doorn, Austerlitz, Driebergen, Groenekan, Bilthoven, Soesterberg, Amersfoort. N.H.: 's-Graveland, Blaricum, Huizen, de Koog (Texel), Bergen, Aerdenhout, Heemstede. Z.H.: Wassenaar, Meijendel, Loosduinen, Kijkduin, Staelduin, Oostvoorne, Ouddorp. Zl.: Burgh, Westenschouwen, Oostkapelle. N.B.: Hoogerheide, Oosterhout, Rijen, Goirle, Oirschot, Vessem, Bergeijk, Eindhoven, Asten, Helenaveen, Sint Anthonis, Uden, Gassel. Lbg.: Afferden, Bergen, Tegelen, Belfeld, Kessel, Swalmen, Sevenum, Weert, Herten, Montfort, Echt, Stein, Schinveld, Heerlerheide, Gronsveld, Epen, Vijlen, Vaals.

Variabiliteit. f. *immaculata* Staudinger, 1871. Van de uiterst zeldzame vorm zonder witte vlek op de voorvleugels zag ik een exemplaar van Vaassen (SOUTENDIJK) en een tweede van Wassenaar (BOTZEN).

f. *rufata* Warren, 1911. Nieuwe vindplaats van de vorm met roodbruin gerande of gevulde niervlek: Bergeijk (VAN WISSELINGH).

f. *rubrociliata* Schawerda, 1931. Van de vorm, waarbij bovendien de binnenhelft van de franje roodbruin is, werden nog exemplaren aangetroffen te: Aalten (Zoöl. Mus.); Bergeijk (VAN WISSELINGH).

f. *postvirescens* van Wisselingh, 1961, *Ent. Ber.* 21: 39. Achtervleugels lichtgroen. Bergeijk (VAN WISSELINGH).

f. **postgrisea** nov. Achtervleugels eenkleurig grijs, overigens normaal. Otterlo, ♂, 17.VIII.1960 (holotype, VAN AARTSEN, in Zoöl. Mus., plus een tweede exemplaar van dezelfde vindplaats en datum).

[Hind wings unicolorous grey, for the rest normal.]

Celaena Stephens

Celaena leucostigma Hübner. *Tijdschr. Entom.* 85: 105; Cat. VII: (432). De in 1943 aangegeven verbreiding is goed. Zelfs in de duinen is de vlinder aan te treffen, als er maar vochtige valleien zijn: die vormen een voortreffelijk biotoop. Merkwaardig is de soms enorme populatietoename, die in biezonder gunstige omstandigheden kan plaats vinden. In Cat. VII werd dit al vermeld van Lobith. In waarschijnlijk nog sterkere mate is dit in Oostelijk Flevoland het geval geweest, waar *leucostigma* vooral in 1961 enorm talrijk was.

Nu bekend van twee der waddeneilanden, Schiermonnikoog en Terschelling.

De vliegtijd kan al in de tweede helft van juni beginnen en voortduren tot in oktober. In 1961 vloog de vlinder zonder onderbreking van 22 juni tot 1 oktober te Lelystad (VAN DE POL). De uiterste data zijn nu: 22.VI—7.X.

Vindplaatsen. Fr.: Terschelling (regelmatig in vochtige duinpannen, TANIS), Sexbierum, Leeuwarden, Tietjerk, Eernewoude, Grouw, Hieslum, Fochtelo, Nijetrijne (zeer talrijk, LEFFEF). Gr.: Boerakker, Glimmen, Borgercompagnie, Veendam. Dr.: Peize, Norg, Eext, Schoonlo, Odoorn, Dwingelo. Ov.: Volthe, Almelo, Aadorp, Vriezenveen, Raalte, Abdij Sion, Colmschate, Platvoet, Zwolle, Zwartsluis, Vollenhove, Marknesse. Flevoland: Lelystad. Gdl.: Ermelo, Hulshorst, Nunspeet, Wiessel, Teuge, Empe, Hoenderlo, Otterlo, Wageningen, Bennekom, Lunteren; Almen, Korenburgerveen, Babberich; Slijk-Ewijk, Ingen, Geldermalsen. Utr.: Amerongen, Zeist, Spakenburg, Baarn, Maarssen. N.H.: 's-Graveland, Naarden, Naardermeer, Weesp, Ouderkerk, Amsterdamse Bos, Halfweg, Landsmeer, Zaandam, Assendelft, Nek, Purmerend, Middelie, Oosthuizen, Den Helder, Bergen, Bakkum, Heemskerk, Aerdenhout, Heemstede. Z.H.: Noorden, Oegstgeest, Wassenaar, Den Haag, Delft, Staelduin, Schelluinen, Gorkum, Arkel, Hendrik-Ido-Ambacht (meestal niet gewoon, maar in 1963 niet minder dan 40 stuks, BOGAARD), Dordrecht, Oostvoorne, Hellevoetsluis, Middelharnis, Melissant. Zl.: Renesse, Burgh, Haamstede, Westenschouwen, Oostkapelle, Goes, Cadzand. N.B.: Waalwijk, Drunen, Kampina, Alphen, Bergeijk, Eindhoven, Nuenen, Helmond, Helenaveen. Lbg.: Milsbeek, De Hamert, Velden, Griendsveen, Sevenum, Steijl, Swalmen, Heel, Montfort, Stein, Sittard, Amstenrade, Brunssum, Valkenburg, Geulem, Gronsveld, Epen, Vijlen.

Variabiliteit. De typische vorm met eenkleurig donkerbruine voorvleugels en gele niervlek is de meest voorkomende vorm van de soort hier te lande.

f. *albipuncta* Tutt, 1890. Als in 1943 werd aangegeven.

f. *nigrobrunneata* Du Bois-Reymond, 1931. Exemplaren met eenkleurig zwartbruine voorvleugels en gele of witte niervlek zijn zeldzaam. Zulke donkere exemplaren werden nog bekend van: Lelystad (VAN DE POL); Rotterdam (LUCAS); Deurne (NIES).

f. *purpurascens* Lempke, 1943. Geen nieuwe vangsten.

f. *pallida* Heydemann, 1938. De vorm met bleek roodachtig bruine voorvleugels en vuilwitte achtervleugels is zeldzaam. Nieuwe vindplaatsen: Lelystad, Slijk-Ewijk (ook exemplaren met bonte voorvleugels, VAN DE POL); Bussum (TER LAAG); Helenaveen (LEFFEF).

f. *intermedia-flavo* Tutt, 1890. Zoals de naam reeds aanduidt, is dit de tussenvorm tussen de eenkleurige vorm en de opvallend bonte. De gewaterde band is lichter dan de grondkleur, maar steekt niet opvallend af. De vorm is gewoon, komt in aantal zelfs meer voor dan f. *albipuncta.*

f. *lunina* Haworth, 1809. Dezelfde vorm, maar met witte niervlek, is weer veel

schaarser (zie de opmerking aan het slot), doch zal wel overal onder de soort kunnen voorkomen.

f. *fibrosa* Hübner, [1803—1808]. Onder deze naam moeten alle extreem bonte exemplaren worden samengevat. De gewaterde band steekt scherp af evenals de lichte gevorkte ader onder de niervlek. Deze kan weer geel zijn, of, zoals in de afbeelding van Hübner, wit (wat weer minder voorkomt). De vorm is vrij gewoon en komt op alle vindplaatsen onder de soort voor, maar is minder talrijk dan *intermedia-flavo* plus *lunina*.

f. **obsoleta** nov. Voorvleugels eenkleurig, niervlek nog slechts flauw zichtbaar. Lelystad, ♂, augustus 1961 (holotype, Zoöl. Mus.).

[Fore wings unicolorous, reniform obsolete.]

Dwergen. Volthe (van der Meulen); Hollandse Rading, Halfweg, Haamstede (Zoöl. Mus.).

Opmerking. Toen in augustus 1961 de vlinder enorm talrijk in het vangapparaat van de Plantenziektenkundige Dienst te Lelystad werd aangetroffen, was ik in de gelegenheid de totale vangsten van een paar dagen mee te nemen. Deze ongesorteerde serie bevatte de volgende vormen:

Eenkleurige dieren met gele niervlek (de typische vorm) 126 stuks (50%).
Eenkleurige dieren met witte niervlek (f. *albipuncta*) 45 stuks (18%).
Bonte dieren met gele niervlek 53 stuks (22%).
Bonte dieren met witte niervlek 23 stuks (10%).

Helaas werden de bonte exemplaren toen niet gesorteerd in de tussenvorm (*lunina*) en de extreme vorm (*fibrosa*). In elk geval had 72% een gele niervlek en 28% een witte, wat wel aardig op een 3 : 1 splitsing gaat lijken. Dan zou de gele vlek dominant zijn over de witte.

Het materiaal in het Zoöl. Mus., dat natuurlijk altijd enigszins uitgezocht is (bonte dieren zijn nu eenmaal mooier), maar dat nauwkeuriger gesorteerd kon worden, levert het volgende resultaat op: typische vorm 104 stuks (47%), f. *albipuncta* 38 stuks (17%), f. *intermedia-flavo* 44 stuks (20%), f. *lunina* 12 stuks (5%) en f. *fibrosa* 24 stuks, gesplitst in 13 gele en 11 witte (11%, waarvan 6% geel en 5% wit). Dit geeft een totaal van 73% geel gevlekte en 27% wit gevlekte exemplaren, wat bijna overeenstemt met de onuitgezochte serie.

Verdeeld over de tekening vinden we: 64% eenkleurig, 25% intermediair en 11% opvallend bont. De gezamenlijke bonte dieren zijn hierbij dus iets talrijker dan bij de onuitgezochte serie. Uit deze getallen is echter niet zo maar een conclusie te trekken over de wijze, waarop de tekening waarschijnlijk zal overerven. Wel is duidelijk, dat de kleur van de niervlek en de tekening van de voorvleugels zich onafhankelijk van elkaar gedragen. Als de vlinder niet zo moeilijk uit het ei te kweken zou zijn doordat de rups in wortels van moerasplanten leeft, zou de soort een mooi object zijn voor verdere genetische studie.

Celaena haworthii Curtis. *Tijdschr. Entom.* 85: 106; Cat. VII: (433). Het optimale biotoop wordt wel gevormd door vochtige veenachtige terreinen, maar daarnaast is de vlinder op zoveel plaatsen buiten zulke gebieden aangetroffen (zij het ook nooit in zulke aantallen), dat het genoemde biotoop zeker niet het enige is

waarin hij kan leven. De meest onverwachte vangsten zijn ongetwijfeld die op de eilanden Ameland, Terschelling en Schouwen.

De vliegtijd kan tot begin oktober duren. De uiterste data zijn nu: 11.VII—10.X. De laatste datum werd door LEFFEF in de Peel waargenomen.

Vindplaatsen. Fr.: Ameland (1960, CAMPING), Terschelling (enkele exemplaren, TANIS), Eernewoude, Oosterwolde, Nijetrijne (weinig, LEFFEF). Gr.: Glimmen, Noordlaren. Dr.: Peize, Peizerveen, Bunnerveen, Norg, Vries, Grollo, Schoonlo, Odoorn, Wijster. Ov.: Abdij Sion, Kalenberg. Gdl.: Ermelo, Wageningen, Bennekom, Lunteren; Korenburgerveen, Winterswijk, Aalten. Utr.: Leersum. Z.H.: Schelluinen, Arkel. Zl.: Haamstede, Westenschouwen. N.B.: Haaren, Best, Bergeijk, Nuenen, Helenaveen. Lbg.: Sevenum, Griendsveen (hier talrijk in 1964, LEFFEF), Velden, Swalmen, Montfort, Heel, Stein (één exemplaar in 1958), Eperheide, Epen.

Variabiliteit. De nominaatvorm is de Britse, door CURTIS beschreven naar materiaal van Whittlesea Mere (Cambridge) en Windermere (Lancashire) (1829, Brit. Ent. 6, tekst bij plaat 260). Hij noemt de grondkleur van de voorvleugels „yellowish brown, variegated with rosy scales". Deze kleurbeschrijving is inderdaad uitstekend voor de Britse nominaatvorm, maar hij beantwoordt in het geheel niet aan de tint van de Nederlandse populaties, niettegenstaande de grote variabiliteit, die onze dieren eigen is. Zij behoren tot een veel donkerder en gemiddeld grotere subspecies, met soms haast zwartbruine voorvleugels. Al onze Nederlandse populaties, ook die van de eilanden, moeten gerekend worden tot subsp. *erupta* Germar, door deze auteur in 1842 beschreven en afgebeeld naar materiaal uit de omgeving van Danzig (als een nieuwe soort, de naam is dus zonder verandering van auteur geldig als naam voor een subspecies). Dank zij de hulp van Mr. A. L. GOODSON (Zoological Museum Tring) en Dr. H. J. HANNEMANN (Zoologisches Museum Berlin), die mij Brits en Duits materiaal ter vergelijking zonden, was het mogelijk dit probleem op te lossen. Zie plaat 14 fig. 1—12.

Note. The Dutch populations of *Celaena haworthii* do not belong to the British nominate form. This has yellowish brown fore wings, as CURTIS rightly wrote. Compared with the Dutch material the fore wings are distinctly paler.

All Dutch populations belong to a much darker and on an average larger subspecies, the correct name of which is subsp. *erupta* Germar, described by the author as a new species from the neighbourhood of Danzig (1842, Fauna Ins. Eur. XXII, pl. 15 fig. a, b). Dr. HANNEMANN kindly sent me a few specimens from Waren in Mecklenburg, which perfectly agree with GERMAR's figures. The Dutch populations obviously belong to the same subspecies as the specimens from northern Germany.

The specimens figured by GERMAR have black-brown fore wings, sharply contrasting pale orbicular and reniform without dark centre, and paler submarginal and marginal bands. Often the cubitus and the two nervures arising from the lower edge of the reniform are also pale so that a strong resemblance in markings results with the variegated form of *Celaena leucostigma*. Cf. plate 14 fig. 1—12.

f. **rufescens** nov. Grondkleur van de voorvleugels donker roodbruin. Wel overal onder de soort voorkomend, maar veel minder dan de exemplaren zonder duidelijke rode tint.

Holotype: ♂, Griendsveen, VIII.1964 (LEFFEF, in Zoöl. Mus.).

[Ground colour of the fore wings dark red-brown.]

f. **grisescens** nov. Grondkleur van de voorvleugels grijsachtig bruin, zonder

enige rode tint, maar veel lichter dan de typische *erupta*. Plaat 14 fig. 7. Griendsveen, ♀, VIII.1964 (LEFFEF, in Zoöl. Mus.).

[Ground colour of the fore wings greyish brown, without any red tint, but much paler than in typical *erupta*.]

f. **nigrescens** nov. Grondkleur van de voorvleugels zwartachtig, achtervleugels zwartgrijs. Plaat 14 fig. 8. Griendsveen, ♂, VIII.1964 (holotype, LEFFEF, in Zoöl. Mus.).

[Ground colour of the fore wings blackish, hind wings black-grey.]

f. **virgata** nov. Het middenveld van de voorvleugels duidelijk donkerder dan het wortelveld en het achterrandsveld. Plaat 14 fig. 9. Aalten, 1951 (VAN GALEN); Griendsveen, ♂, VIII.1964 (holotype, LEFFEF, in Zoöl. Mus.).

[The central area of the fore wings distinctly darker than the basal and marginal areas.]

f. **unicolor** nov. De voorvleugels bijna eenkleurig van tint, de ronde vlek en de niervlek grotendeels donker gevuld, zelfs de twee lichte aderen vanuit de niervlek kunnen ontbreken. Plaat 14 fig. 10. Overal onder de soort, maar minder dan de bonte vormen. Holotype: ♂ van Griendsveen, VIII.1964, LEFFEF leg., in Zoöl. Mus.

[The fore wings are nearly unicolorous, the orbicular and the reniform with a large dark centre, so that a pale ring remains; even the pale forked nervures arising from the reniform may be absent.]

f. **obsoleta** nov. Voorvleugels eenkleurig donker roodbruin, de ronde vlek en de niervlek min of meer overdekt door de grondkleur (maar zonder donkere vulling), zodat ze veel zwakker zijn of zelfs nauwelijks zichtbaar kunnen zijn. Kortenhoef, drie exemplaren, Heel, Griendsveen (Zoöl. Mus.).
Holotype: ♂ van Kortenhoef, 13.VII.1949, in Zoöl. Mus.

[Fore wings unicolorous red-brown, orbicular and reniform more or less covered by the ground colour (but without dark centre), so that they are much feebler or may even be obsolete.]

f. **protensa** nov. De ronde vlek wortelwaarts uitgerekt tot aan de eerste dwarslijn. Plaat 14 fig. 12. Griendsveen, ♂, VIII.1964 (holotype, LEFFEF, in Zoöl. Mus.), plus een paar andere exemplaren van dezelfde vindplaats en datum.

[Orbicular lengthened in the direction of the base and touching the antemedian.]

f. **semiconfluens** nov. Ronde vlek en niervlek smal met elkaar verbonden. Plaat 14 fig. 11. Griendsveen, ♂, VIII.1964 (holotype, LEFFEF, in Zoöl. Mus.).

[Orbicular and reniform narrowly connected with each other.]

Nonagria Ochsenheimer

Nonagria typhae Thunberg. *Tijdschr. Entom.* 84: 349; Cat. VI: (397). Vooral verbreid in de lage delen van het land, maar eigenlijk overal te verwachten waar de voedselplanten van de rupsen voorkomen. Op moerassige terreinen niet zelden gewoon. Tot nog toe slechts van één van de waddeneilanden bekend.

Een kleine correctie op de vliegtijd, waarvan de uiterste data nu worden: 18.VII—24.X.

Vindplaatsen. Fr.: Terschelling (weinig, LEFFEF), Tietjerk, Wartena, Eernewoude, Goëngarijp, Peperga, Nijetrijne (talrijk, LEFFEF), Scherpenzeel, Tjerkwerd. Gr.: Glimmen, Noordlaren, Borgercompagnie. Dr.: Peize, Anlo, Eext. Ov.: Tilligte, Volthe, Agelo, Reutum, Weerselo, Saasveld (Molenven), Almelo, Vriezenveense Wijk, Raalte, Abdij Sion, Colmschate, Zwartsluis, Vollenhove, Marknesse. Flevoland: Lelystad. Gdl.: Wiessel, Wenum, Beemte, Teuge, Klarenbeek, Empe, Voorstonden, Hall, Laag-Soeren; Korenburgerveen, Doetinchem, Hoog-Keppel, Didam, Groessen; Ooi, Slijk-Ewijk. Utr.: Amersfoort, Eemnes, Vechten, Vinkeveen, Botshol. N.H.: 's-Graveland, Hilversum, Ankeveen, Naardermeer, Weesp, Ouderkerk, Amsterdamse Bos, Halfweg, Landsmeer, Jisp, Middelie, Oosthuizen, Berkhout, Hoorn, Kennemerduin. Z.H.: Woerdense Verlaat, Noorden, Reeuwijk, Leiden, Rijnsburg, Voorschoten, Voorburg, Delft, Capelle aan den IJssel, Giessenburg (Giessen-Nieuwkerk), Schelluinen, Arkel, Spijk, Hendrik-Ido-Ambacht, Oostvoorne, Hellevoetsluis, Melissant. Zl.: Burgh, Haamstede, Westenschouwen, Goes, Cadzand. N.B.: Bergen op Zoom, Willemsdorp, Waalwijk, Best, Bergeijk, Eindhoven, Geldrop, Asten, Helenaveen, Sint Anthonis, Gassel. Lbg.: Mook, Plasmolen, Griendsveen Swalmen, Montfort, Echt, Stein, Heerlen, Gronsveld, Epen.

Variabiliteit. De volgende behandeling van dit onderdeel vervangt geheel die van 1943. De vlinder is zeer duidelijk sexueel dimorf. De wijfjes zijn licht grijsbruin, de mannetjes hebben vrij donker bruinachtige voorvleugels. In de nieuwe editie van „SOUTH" (Moths 1, pl. 122 fig. 6 en 7, 1961) staan uitstekende afbeeldingen van beide geslachten. Wat in 1943 de „tussenvorm" genoemd werd, is niets anders dan het normale ♂. Overigens variëren zowel het typische ♀ als het ♂ wel iets in tint, zonder dat echter van bepaalde kleurvormen gesproken kan worden.

Zeer opvallend zijn de donkere dieren, die in de regel alle als f. *fraterna* vermeld worden, maar waarbij men een veel grotere variabiliteit aantreft dan bij de typische vorm. De meeste collecties bevatten echter te weinig materiaal ervan om dit duidelijk te doen uitkomen.

f. **pallida** nov. Voorvleugels witachtig grijsbruin, achtervleugels witachtig, abdomen witachtig grijs. Arkel, ♀, 15.VIII.1962 (holotype, ZWAKHALS).

[Fore wings whitish grey-brown, hind wings whitish, abdomen whitish grey.]

f. **grisescens** nov. Grondkleur van de voorvleugels vrij donker bruingrijs, een volkomen andere tint dan bij het normale ♂. Deze kleurvorm komt in precies dezelfde tint bij beide seksen voor. Arkel, ♀, 19.IX.1962 (holotype), plus een tweede ♀ van hetzelfde jaar, Rotterdam, ♂, 1901 (Zoöl. Mus.).

[Ground colour of the fore wings of a rather dark grey-brown, a quite different tint than with the normal ♂. This colour form is found in both sexes in exactly the same tint.]

f. *fraterna* Borkhausen, 1792 (*Noctua nervosa* Esper, [1790], nec Schiff., 1775). Voorvleugels zwartachtig bruin, maar tamelijk bont doordat de aderen vooral in de achterrandshelft lichter zijn. Plaat 12 fig. 7. Voor zover ik nu weet een vrij zeldzame vorm, die vooral bij het ♂ schijnt voor te komen. In het Zoöl. Mus. bevinden zich slechts vier mannetjes van Arkel en Spijk (Z.H.) (ZWAKHALS leg.), maar in de collectie-ZWAKHALS bevindt zich ook een ♀ van Arkel. Verder bekend van Amsterdam (VAN DER MEULEN).

[There cannot be the slightest doubt that *fraterna* and *nervosa* are the same form, as

BORKHAUSEN refers to the figure of ESPER and the latter cites the text of BORKHAUSEN. ESPER leaves it to the reader which name he prefers. But ESPER's name is invalid, being a primary homonym. His form is not an intermediate one, as WARREN writes ("SEITZ" 3: 234, 1911), but a dark form with blackish-brown ground colour of the fore wings. The nervures of these wings are in the outer half paler, thus producing a rather variegated form, quite different from that described as a rule as the dark form of *typhae*. BORKHAUSEN described the same variegated form ("Graubraun und gelblichgestreifte Eule"). As far as my experience goes at present, this form, figured on plate 12 fig. 7, is rather rare, but it occurs in both sexes, although it seems to be principally a male form. At present I only know one female.]

f. **obscura** nov. Voorvleugels eenkleurig donkerbruin, zwartachtig bruin of roodachtig zwartbruin, vrij variabel dus, maar het is onmogelijk een grens te trekken tussen de verschillende tinten. Van de tekening is in de regel alleen de submarginale rij zwarte streepjes te zien. Plaat 12 fig. 8. Deze vorm is de gewone donkere vorm van *typhae* die in de regel als *fraterna* beschreven en afgebeeld wordt. Zowel bij ♂ als ♀ in dezelfde verhouding voorkomend. Procentueel in de regel niet talrijk, maar vrij zeker overal onder de soort aan te treffen.

Holotype: ♂ van Twello, 21.X.1928, in Zoöl. Mus.

[Fore wings unicolorous dark brown, blackish brown or reddish black-brown. Rather variable, but it is not possible to make a sharp distinction between the different tints. The only distinct markings are as a rule the submarginal stripes. Occurring in about the same percentage with male and female.]

f. **nigra** nov. Voorvleugels eenkleurig zwart zonder enige bruine of rode tint. Tot nog toe een rariteit onder de donkere exemplaren van *typhae*. Giessenburg, ♂, 25.VIII.1962 (holotype, SLOB); Nijetrijne, 1964 (LEFFEF); Utrecht, ♂, 1961 (BERK).

[Fore wings unicolorous black without any brown or reddish tint.]

f. *obsoleta* Dufrane, 1932. Exemplaren zonder de zwarte pijlvlekken op de voorvleugels komen in gering aantal op de meeste vindplaatsen onder de soort voor.

Dwergen. Nijetrijne (LEFFEF); Botshol (PIET); Arkel (ZWAKHALS).

Archanara Walker

Archanara geminipuncta Haworth. *Tijdschr. Entom.* 84: 347; Cat. VI: (395). De vlinder is vrij verbreid in een groot deel van het land en kan vooral in het Hafdistrict als rups soms zeer gewoon zijn. Daarbuiten echter is het in de regel een vrij schaarse soort, te oordelen tenminste naar de resultaten van lichtvangsten. In het Waddendistrict is de soort nu van één van de eilanden bekend. De enige provincie waaruit nog geen vondsten gemeld zijn, is Groningen. Maar ook hier zal *geminipuncta* wel te vinden zijn, als er maar naar rupsen gezocht wordt. Verzamelaars in dit gebied moeten in juli maar eens letten op rietstengels met dode hartbladeren. Dan zullen ze in de stengels ook wel de venstertjes vinden, die door de rupsen voor de verpopping gemaakt worden.

De vliegtijd kan al in de eerste helft van juli beginnen en tot begin oktober voortduren. De uiterste data zijn nu: 13.VII (1961, Missiehuis Stein) tot 1.X (1962, Oosthuizen, DE BOER).

V i n d p l a a t s e n. Fr.: Terschelling (plaatselijk gewoon, TANIS), Leeuwarden, Oosterwolde, Peperga, Nijetrijne, Oude Mirdum. Dr.: Norg, Schoonlo. Ov.: Volthe, Almelo, Aadorp, Holten, Beerze, Raalte, Abdij Sion, Colmschate, Vollenhove, Marknesse. Flevoland: Lelystad.

Gdl.: Elburg, Wiessel, Hoog-Soeren, Teuge, Wilp, Laag-Soeren, Otterlo, Lunteren; Gorssel, Zutfen, Hoog-Keppel, Didam, Groessen; Slijk-Ewijk. Utr.: Zeist, Rhijnauwen, Utrecht, Soest, Eemnes, Hollandse Rading. N.H.: 's-Graveland, Kortenhoef, Weesp, Diemen, Amsterdamse Bos (weinig, PEERDEMAN), Halfweg, Zaandam, Nek, Middelie, Beemster, Oosthuizen, Hoorn, Castricum, Heemskerk, Haarlem, Aerdenhout. Z.H.: Woerdense Verlaat, Noorden, Reeuwijk, Delft, Staelduin, Vlaardingen, Maassluis, Capelle aan den IJssel, Vianen, Schelluinen, Arkel, Hendrik-Ido-Ambacht, Oostvoorne, Middelharnis, Melissant, Goedereede. Zl.: Burgh, Haamstede, Westenschouwen, Oostkapelle, Valkenisse, Cadzand, Clinge (gewoon, PEERDEMAN). N.B.: 's-Hertogenbosch, Kampina, Best, Nuenen, Bergeijk, Geldrop, Helenaveen, Gassel. Lbg.: Venlo, Steijl, Swalmen, Griendsveen, Roggel, Heel, Montfort, Geulem.

Variabiliteit. Bij alle kleurvormen is de groep met één witte stip op de voorvleugels de gewoonste, die met twee stippen is minder talrijk en die zonder de stippen is steeds het zeldzaamst. Een duidelijke aanwijzing, dat deze eigenschap zich onafhankelijk van de grondkleur gedraagt.

De typische kleurvorm met vrij donkerbruine voorvleugels, die vaak langs de binnenrand wat lichter zijn, is de gewoonste vorm. De door HAWORTH beschreven vorm met twee witte stippen op de plaats van de niervlek is gewoon, de vorm met één witte stip (f. *unipuncta* Tutt, 1891) is zeer gewoon, de vorm zonder witte stip (f. *obsoleta* Tutt, 1891) komt veel minder voor, maar is toch wel overal onder de soort te vinden.

f. *pallida* Tutt, 1891. De vorm met licht bruinachtige of geelachtig bruine voorvleugels en twee witte stippen is vrij zeldzaam, maar komt waarschijnlijk wel overal onder de soort voor. Met één witte stip (f. *pallida-unipuncta* Tutt, 1891) is de kleurvorm wat gewoner, terwijl de lichte vorm zonder witte punten (f. *pallida-obsoleta* Tutt, 1891) beslist zeldzaam is. In het Zoöl. Mus. slechts één exemplaar van Rotterdam.

f. *rufa* Tutt, 1891. De groep met roodachtig bruine voorvleugels (lichter of donkerder) is (op de nieuwe f. *grisea* na) inderdaad de minst voorkomende groep. De typische *rufa* met twee witte stippen komt niet veel voor. In Zoöl. Mus. slechts twee stuks van Weesp en Domburg. Verder nog aangetroffen te Marknesse en Bennekom (VAN DE POL); Hendrik-Ido-Ambacht (LUCAS).

Met één witte stip (f. *rufa-unipuncta* Tutt, 1891) is de vorm wat minder zeldzaam. Hiervan bevinden zich in het Zoöl. Mus. vier stuks, behalve het reeds vermelde van Hillegersberg nog van Vaassen, Zevenhuizen en Zaltbommel. Verdere vindplaatsen: Marknesse, Bennekom (VAN DE POL); Clinge (PEERDEMAN).

Zonder witte stip (f. *rufa-obsoleta* Tutt, 1891) komt de vorm weer weinig voor. In het Zoöl. Mus. slechts twee stuks, behalve het reeds vermelde van Domburg nog een tweede van Buren.

f. *fusca* Tutt, 1891. Exemplaren met zwartachtig bruine voorvleugels komen stellig overal onder de soort voor. De typische *fusca* met twee witte stippen is niet gewoon, de vorm met één witte stip (f. *fusca-unipuncta* Tutt, 1891) is vrij gewoon en die zonder witte stip (f. *nigricans* Staudinger, 1861) is vrij zeldzaam, wat wel blijkt uit het feit, dat de collectie van het Zoöl. Mus. slechts zes exemplaren ervan bevat, behalve de reeds vermelde van: Hollandse Rading, Naardermeer en Weesp. Verder bekend van Lunteren (BRANGER); Clinge (PEERDEMAN); Epen (VAN WISSELINGH).

f. **grisea** nov. Grondkleur van de voorvleugels grijs zonder enige bruine of rode tint. Griendsveen, ♀, 23.VII.1964 (holotype, LEFFEF).

[Ground colour of the fore wings grey, without any brown or red tint.]

f. *paludicola* Hübner, [1814—1817]. Exemplaren met vooral in het distale uiteinde wit bestoven aderen op de voorvleugels werden nog bekend van Kesteren, Zevenhuizen (Zoöl. Mus.); Amerongen, Noorden (LUCAS).

f. **nervosa** nov. Bovenzijde voorvleugels: het distale uiteinde van de aderen zwart. Arkel, ♂, 2.VIII.1961 (holotype, ZWAKHALS).

[Upper side fore wings: the distal end of the nervures black.]

f. *nigropunctata* Krombach, 1920. Exemplaren met uitsluitend zwarte stippen op de plaats van ronde vlek en niervlek werden nog aangetroffen te: Warga, Weesp (Zoöl. Mus.); Wageningen (VAN DE POL); Oostvoorne (LUCAS).

f. *jaeschkei* Warnecke, 1929. Exemplaren met opvallend duidelijke dwarslijnen op de voorvleugels zijn zeldzaamheden. Weesp, ♂ (Zoöl. Mus.).

Dwerg. Arkel (ZWAKHALS).

Archanara dissoluta Treitschke. *Tijdschr. Entom.* 84: 346; Cat. VI: (394). Sinds de publicatie van Cat. VI in 1941 zijn een verrassend groot aantal nieuwe vindplaatsen bekend geworden. Of deze alle aan het resultaat van lichtvangst in het goede biotoop toegeschreven moeten worden, of dat de vlinder zijn territorium hier te lande flink uitgebreid heeft, is moeilijk uit te maken. Mogelijk zijn beide factoren in het geding. Dat het dier in elk geval snel zijn territorium kan uitbreiden, volgt uit de vangst te Lelystad kort na het droogvallen van Oostelijk Flevoland.

De vlinder blijkt in een groot deel van het land voor te komen en kan plaatselijk heel gewoon zijn. Natuurlijk onbreekt hij op zeer droge zandgronden.

In Denemarken is *dissoluta* nu ook bekend van Bornholm, Langeland en Jutland. In België blijft de vlinder een zeldzaamheid. De heer DE LAEVER kon me slechts vier vindplaatsen opgeven: Houffalize (prov. Luxemburg), Han-sur-Lesse en Grand Menil (Namen) en Sclessin (Luik). In Groot-Brittannië is net als bij ons het aantal vindplaatsen sterk toegenomen. In de nieuwe editie van „SOUTH" (Moths 1: 341, 1961) worden een groot aantal graafschappen opgesomd van waaruit de vlinder nu bekend is, verspreid over Engeland van de zuidkust tot Lancashire in het noorden. In Schotland en Ierland is *dissoluta* echter nog steeds niet aangetroffen.

De vliegtijd kan van half juni tot begin september duren. De uiterste data zijn nu: 17.VI (in 1948 te Middelie, SLOT) tot 7.IX (in 1955 op dezelfde vindplaats). Hoofdvliegtijd tweede helft van juli tot in de tweede helft van augustus.

In de hierna volgende lijst van vindplaatsen zijn ook de vijf van 1941 opgenomen, zodat men een volledig overzicht heeft van de nu bekende verspreiding.

Vindplaatsen. Fr.: Sexbierum, Eernewoude, Nijetrijne (gewoon, LEFFEF). Gr.: Glimmen. Dr.: Paterswolde. Ov.: Saasveld (Molenven), Holten, Raalte, Zwartsluis, Kalenberg, Vollenhove. Flevoland: Lelystad. Gdl.: Apeldoorn, Twello, Wageningen, Bennekom; Zutfen, Korenburgerveen (in 1947 talrijk, SCHOLTEN), Aalten. Utr.: Zeist, Rhijnauwen, Utrecht, Oud-Loosdrecht, Nigtevecht, Botshol. N.H.: Hilversum, Kortenhoef (in 1947 talrijk op licht, CARON), Naardermeer, Weesp, Muiden, Amsterdam, Amsterdamse Bos, Wormer-

veer, Middelie, Oosthuizen, Hoorn. Z.H.: Woerdense Verlaat, Reeuwijk, Meijendel, Delft, Zevenhuizen, Hillegersberg, Rotterdam, Schelluinen, Arkel, Asperen, Oostvoorne (in 1963 talrijk, VIS c.s.), Melissant. Zl.: Valkenisse, Goes. N.B.: Haaren, Best, Nuenen, Deurne. Lbg.: Plasmolen, Grubbenvorst, Venlo, Tegelen, Steijl, Swalmen, Griendsveen (vrij talrijk, LEFFEF), Sint Odiliënberg, Melick, Montfort, Geulem, Epen.

Variabiliteit. De zwartbruine overal zeldzame typische vorm (zie SOUTH, Moths 1 (nieuwe editie), plaat 125 fig. 4, 5) is bij ons op betrekkelijk veel plaatsen aangetroffen, maar steeds in een enkel exemplaar. Aan de in 1941 vermelde vindplaats Hillegersberg kunnen nu de volgende toegevoegd worden: Saasveld (Molenven) (VAN DER MEULEN); Kalenberg (AUKEMA); Zutfen (WILMINK); Korenburgerveen (SCHOLTEN); Wormerveer (HUISENGA); Middelie (DE BOER); Goes (Zoöl. Mus.); Deurne (NIES); Plasmolen (LUCAS); Swalmen (LÜCKER); Epen (VAN WISSELINGH).

f. *arundineta* Schmidt, 1858, met veel lichtere, bruinachtig gele voorvleugels, is uitstekend afgebeeld in de nieuwe editie van „SOUTH", l. c., fig. 6 en 7. Zoals overal is het ook bij ons de veruit overheersende vorm.

f. **rufescens** nov. Grondkleur van de voorvleugels roodachtig bruin. Kortenhoef (CARON); Noorden, ♂, 18.VIII.1958 (holotype, LUCAS).

[Ground colour of the fore wings reddish brown.]

f. *striata* Lempke, 1941. De vorm met donker bestoven voorrand en zware donkere bestuiving onder de middenader van de voorvleugels is zeer gewoon.

Archanara neurica Hübner. *Tijdschr. Entom.* 84: 345; Cat. VI: (393). De soort met het witte halskraagje (maar zonder middenstippen op de onderzijde van de vleugels) blijkt toch lokaler te zijn dan de vorige. Hoewel ook bij *neurica* vrij veel nieuwe vindplaatsen bekend geworden zijn, is het totale aantal slechts ongeveer de helft van dat van *dissoluta*. Toch kan ook *neurica* plaatselijk gewoon zijn.

In België is de soort nog steeds niet aangetroffen. Op de Britse eilanden is het areaal veel beperkter dan dat van *dissoluta*, daar het nog altijd slechts de twee Engelse graafschappen Sussex en Suffolk omvat.

De nu bekende vliegtijd loopt van eind juni tot in de tweede helft van augustus met als uiterste data: 30.VI—19.VIII. De hoofdvliegtijd ligt ongeveer tussen 10 juli en 10 augustus.

Ook van deze soort worden alle nu bekende vindplaatsen vermeld. De acht van 1941 zijn er nu 37 geworden, in elk geval dus een flinke vermeerdering.

Vindplaatsen. Fr.: Giekerk, Warga, Eernewoude (in 1955 gewoon, CAMPING), Nijetrijne (gewoon, LEFFEF), Tjerkwerd. Gdl.: Hoog-Soeren. Utr.: Soesterberg, Botshol. N.H.: 's-Graveland, Kortenhoef, Naarden, Amsterdam, Nek, Heemstede. Z.H.: Woerdense Verlaat, Noorden, Delft, Hillegersberg, Schelluinen, Arkel, Asperen, Hendrik-Ido-Ambacht, Numansdorp. Zl.: Domburg, Valkenisse, Goes, Cadzand. N.B.: Willemsdorp, Klundert, Nuenen, Deurne. Lbg.: Griendsveen (gewoon, LEFFEF), Swalmen, Montfort, Schinnen, Brunssum.

Variabiliteit. f. *fusca* Edelsten, 1911. De vorm met zwartachtig bruine voorvleugels werd nog aangetroffen te: Eernewoude (CAMPING); Nijetrijne (G. DIJKSTRA); Hoog-Soeren (LEFFEF, in Zoöl. Mus.); Soesterberg (VAN KATWIJK); Noorden (LUCAS); Nuenen (NEIJTS). Blijkbaar vrij verbreid onder de soort.

f. **impunctata** nov. De rij postdiscale zwarte stippen op de bovenzijde van de voorvleugels ontbreekt. Domburg, ♂, 11.VIII.1913 (holotype, Zoöl. Mus.).

[The row of postdiscal black points on the upper side of the fore wings is absent.]

f. **continua** nov. De postdiscale zwarte stippen op de bovenzijde van de voorvleugels alle met elkaar verbonden tot een doorlopende lijn van voorrand tot binnenrand. Domburg, ♂, 11.VIII.1913 (holotype, Zoöl. Mus.).

[The row of postdiscal black points on the upper side of the fore wings connected and forming a continuous line from costa to inner margin.]

Archanara sparganii Esper. *Tijdschr. Entom.* 84: 344; Cat. VI: (392). Ongetwijfeld de meest verbreide soort van het geslacht. Vrijwel door het gehele land te vinden op plaatsen, waar de voedselplanten van de rupsen groeien. Nu bekend van twee van de waddeneilanden.

Slechts een kleine correctie op de uiterste data van de vliegtijd, die nu worden: 17.VII—2.X.

Vindplaatsen. Fr.: Terschelling (LEFFEF), Sint Anna Parochie, Oenkerk, Tietjerk, Goëngarijp, Eernewoude, Oosterwolde, Peperga, Nijetrijne (talrijk, LEFFEF), Rijs, Dedgum, Tjerkwerd. Gr.: Groningen, Glimmen, Noordlaren, Borgercompagnie, Veendam. Dr.: Eelderwolde, Eext, Schoonlo, Havelte. Ov.: Volthe, Weerselo, Tilligte, Almelo, Vriezenveense Wijk, Raalte, Abdij Sion, Colmschate, Zwartsluis, Kalenberg, Vollenhove, Marknesse. Flevoland: Lelystad. Gdl.: Wiessel, Apeldoorn, Laag-Soeren, Wageningen, Bennekom, Lunteren; Gorssel, Winterswijk, Korenburgerveen, Aalten, Hoog-Keppel, Didam, Groessen; Slijk-Ewijk, Buren. Utr.: Amerongen, Zeist, De Bilt, Utrecht, Zuilen, Maarsseveen, Westbroek, Tienhoven, Amersfoort, Harmelen, Vinkeveen, Botshol. N.H.: 's-Graveland, Hilversum, Huizen, Naarden, Naardermeer, Muiden, Weesp, Uithoorn, Amsterdamse Bos (gewoon, PEERDEMAN), Amstelveen, Halfweg, Landsmeer, Zaandam, Middelie, Berkhout, Hoorn, De Cocksdorp, Overveen, Aerdenhout. Z.H.: Woerdense Verlaat, Noorden, Nieuwkoop, Reeuwijk, Leiden, Leiderdorp, Leidschendam, Voorschoten, Voorburg, Delft, Staelduin, Vlaardingen, Capelle aan den IJssel, Giessen-Nieuwkerk (Giessenburg), Schelluinen, Arkel, Asperen, Leerdam, Hendrik-Ido-Ambacht (vrij gewoon, BOGAARD), Barendrecht, Oostvoorne, Melissant. Zl.: Burgh, Haamstede, Westenschouwen, Oostkapelle, Valkenisse. N.B.: Moerdijk, Willemsdorp, Oosterhout, Waalwijk, Udenhout, Kampina, Boxtel, Nuenen, Eindhoven, Bergeijk, Helenaveen, Oss, Gassel. Lbg.: Plasmolen, Sevenum, Griendsveen, Tegelen, Steijl, Belfeld, Swalmen, Montfort, Stein, Simpelveld, Geulem, Epen.

Variabiliteit. De licht geelachtige typische vorm met donkere bestuiving onder de middenader is veruit de gewoonste.

f. *obsoleta* Tutt, 1888. De vorm met zeer zwakke tekening (ook de zwarte vlek op de plaats van de niervlek) is gewoon en overal onder de soort aan te treffen. Hij kan bij alle kleurvormen van de soort voorkomen.

f. *bipunctata* Tutt, 1888. De vorm, waarbij alle donkere bestuiving ontbreekt, maar waarbij de twee zwarte stippen op de plaats van ronde vlek en niervlek scherp afsteken, is daarentegen veel schaarser. De collectie van het Zoöl. Mus. bevat er slechts zes stuks van. Toch is hij blijkens het aantal vindplaatsen vrij verbreid onder de soort, zodat ze dan ook niet alle opgesomd worden.

f. *rufescens* Tutt, 1888. De vorm met roodachtig gele voorvleugels is algemeen.

f. *rosea* Wightman, 1930. De vorm met licht rose voorvleugels komt minder voor, maar is wel haast overal onder de soort aan te treffen.

f. *rufa* Wightman, 1930. De vorm met diep roodachtig koperkleurige voorvleugels en licht roodachtig getinte achtervleugels is een zeldzaamheid. Nieuwe vindplaatsen: Vinkeveen (BOTZEN); Heemstede (VAN DE POL); Deurne (NIES).

f. *lutea* Wightman, 1930, in TURNER, Brit. Noct., Suppl. 1: 154. Grondkleur van de voorvleugels helder zwavelgeel, achtervleugels lichter geel. Het beste lijkt me alle exemplaren met geel gekleurde voorvleugels onder deze naam samen te vatten, ook al is de tint niet precies zwavelgeel. VAN DE POL bezit enkele exemplaren met meer oranjegele voorvleugels van Noordlaren, Lelystad en Heemstede.

f. *clara* Turner, 1930, Brit. Noct., Suppl. 1: 154. Voorvleugels iets crèmekleurig wit, achtervleugels wit met flauw gele tint. Een zeer lichte vorm dus. Kortenhoef (Zoöl. Mus.); Helenaveen (PEERDEMAN); Epen (VAN WISSELINGH).

f. **roseomarginata** nov. Achtervleugels met rose band langs de achterrand. Giessen-Nieuwkerk, ♂, 19.VIII.1961 (holotype, ZWAKHALS).

[Hind wings with pink band along the outer margin.]

f. *nigrostriata* Wightman, 1930. De vorm met de drie donkere vegen op de voorvleugels (een onder de voorrand, de tweede onder de middencel en de derde boven de binnenrand) is niet zeldzaam en komt vrij verbreid onder de soort voor, zodat geen vindplaatsen meer vermeld worden.

f. *nigrosignata* Cockayne, 1952, *Ent. Rec.* 64: 192, plaat VIII fig. 11. Aan de wortel van de voorvleugels een korte zwarte streep, een zwarte stip op de plaats van de ronde vlek en twee boven elkaar staande zwarte stippen op de plaats van de niervlek. Zeer opvallend door de drie afzonderlijke zwarte stippen. Deurne, Helenaveen (NIES).

f. **conjuncta** nov. De zwarte stip op de plaats van de ronde vlek verbonden met de stip op de plaats van de niervlek door een zwarte lijn langs de onderzijde van de middencel. Leeuwarden, ♀, 19.VIII.1951 (holotype, Zoöl. Mus.); Deurne, ♂, 1947 (NIES).

[The black point in the place of the orbicular connected by a black line along the cubitus with the point in the place of the reniform.]

f. *impunctata* Turner, 1930. De vorm zonder de rij postmediane streepjes op de voorvleugels is niet gewoon. Nieuwe vindplaatsen: Marknesse, Simpelveld (VAN DE POL); Leidschendam, Rotterdam, Geulem (Zoöl. Mus.); Epen (VAN WISSELINGH).

Dwergen. Niet al te zeldzaam. Aerdenhout, Heemstede (VAN WISSELINGH); Wassenaar (LUCAS); Giessen-Nieuwkerk (ZWAKHALS); Hendrik-Ido-Ambacht (BOGAARD); Nuenen (NEIJTS).

Teratologisch exemplaar. Linker vleugels te klein. Peperga (VAN WISSELINGH).

Archanara algae Esper. *Tijdschr. Entom.* 84: 343; Cat. VI: (391). Lang niet zo verbreid als de vorige soort en ook op de vindplaatsen in de regel minder gewoon. Nog op geen van de waddeneilanden aangetroffen.

Slechts een kleine correctie op de vliegtijd, waarvan de uiterste data nu worden: 17.VII—28.IX.

Vindplaatsen. Fr.: Leeuwarden, Tietjerk, Eernewoude, Oosterwolde, Nijetrijne (gewoon, Leffef), Tjerkwerd. Gr.: Glimmen, Noordlaren. Ov.: Tilligte, Almelo, Colmschate, Deventer, Zwartsluis, Vollenhove. Flevoland: Lelystad. Gdl.: Wiessel, Arnhem, Bennekom; Eefde, de Voorst, Zutfen, Hoog-Keppel, Didam; Slijk-Ewijk. Utr.: Zeist, Amersfoort, Utrecht, Loenen, Hollandse Rading. N.H.: Hilversum, Naardermeer, Amsterdamse Bos (weinig, Peerdeman). Z.H.: Woerdense Verlaat, Wassenaar, Leidschendam, Voorburg, Vlaardingen, Giessenburg, Schelluinen, Spijk, Hendrik-Ido-Ambacht (twee exemplaren in 1957, daarna niet meer, Bogaard), Hellevoetsluis. N.B.: Waalwijk, Kampina, Bergeijk. Lbg.: Plasmolen, Griendsveen, Swalmen, Montfort, Echt, Stein, Heerlen.

Variabiliteit. Verreweg de meeste exemplaren behoren tot de typische vorm (♂ roodbruin, ♀ geelachtig). De soort is lang niet zo variabel als *sparganii*.

f. *brunneo-ochracens* Strand, 1915. Mannetjes met geelbruine voorvleugels werden nog bekend van: Bosch en Duin (Zeist, Gorter); Hilversum (Zoöl. Mus.).

f. *fusca* Bowles, 1898, *Ent. Rec.* 10: 287 (*fumata* Warren, 1911). Voorvleugels zowel bij ♂ als ♀ sterk verdonkerd. Apeldoorn, Hoog-Keppel (Zoöl. Mus.); Groessen, Slijk-Ewijk (van de Pol).

f. *rosea* Bowles, 1898, *Ent. Rec.* 10: 287. Voorvleugels bij het ♂ van een warme rode kleur, bij het ♀ met mooie rose tint. Hollandse Rading, Twello (twee wijfjes, Zoöl. Mus.).

f. *obsoleta* Bowles, 1898, *Ent. Rec.* 10: 287 (*impunctata* Lempke, 1941). Exemplaren zonder (of vrijwel zonder) de rij postdiscale stippen op de voorvleugels werden nog gevangen te: Kalenberg (Aukema); Apeldoorn (Zoöl. Mus.); Zeist - Bos en Duin (Gorter); Helenaveen (Nies).

f. *purpurea* van Wisselingh, 1946, *Tijdschr. Entom.* 89: XXVII. Voorvleugels met paarsachtige tint. Wolvega, ♂ (van Wisselingh).

f. **nigrostriata** nov. Bovenzijde voorvleugels: langs de onderkant van de middencel loopt een zwarte streep. Wageningen, ♀, 17.IX.1953 (holotype, van de Pol).

[Upper side fore wings: along the under side of the cell is a black stripe.]

Dwerg. Spijk (Zwakhals).

Rhizedra Warren

Rhizedra lutosa Hübner. *Tijdschr. Entom.* 85: 77; Cat. VII: (404). Verbreid over vrijwel het gehele land waar maar riet te vinden is, dat op niet te natte plaatsen groeit. Nu bekend van twee van de waddeneilanden.

De vliegtijd kan vroeger beginnen en later eindigen dan in 1943 vermeld werd. De uiterste data zijn nu: 7.VIII (in 1959 te Stein, van de Pol) tot 3.XII (in 1956 te Koog aan de Zaan, Bank).

Vindplaatsen. Fr.: Schiermonnikoog (Stobbe), Terschelling (Leffef), Harlingen, Sexbierum, Leeuwarden, Oenkerk, Tietjerk, Eernewoude, Oosterwolde, Nijetrijne (zeer talrijk, Leffef), Oude Mirdum, Tjerkwerd. Gr.: Groningen, Glimmen, Borgercompagnie, Veendam, Overschild. Dr.: Peizermade, Peize, Eext, Schoonlo. Ov.: Volthe, Saasveld, Borne, Raalte, Abdij Sion, Zwolle, Zwartsluis, Vollenhove, Marknesse. Flevoland: Lelystad (talrijk, van de Pol). Gdl.: Ermelo, Nunspeet, Vaassen, Wiessel, Apeldoorn, Terwolde, Teuge, Empe,

Laag-Soeren, Hoenderlo, Otterlo, Bennekom, Lunteren; Gorssel, Eefde, Almen, Laren, Ruurlo, Hoog-Keppel, Laag-Keppel, Babberich, Nijmegen, Hatert, Slijk-Ewijk, Ochten, Geldermalsen, Neerijnen. Utr.: Amersfoort, Bilthoven, Maarsseveen. N.H.: 's-Graveland, Naarden, Amsterdamse Bos (talrijk, PEERDEMAN), Halfweg, Zaandam, Koog aan de Zaan, Nek, Middelie, Beemster, Hoorn, Schoorl, Bergen, Egmond aan Zee, Heemskerk, Heemstede. Z.H.: Woerdense Verlaat, Wassenaar, Meijendel, Rijswijk, Delft, Staelduin, Vlaardingen, Capelle aan den IJssel, Schelluinen, Arkel, Hendrik-Ido-Ambacht (gewoon, BOGAARD), Pernis, Oud-Beijerland, Oostvoorne, Hellevoetsluis, Melissant, Goedereede, Ouddorp. Zl.: Burgh, Haamstede, Westenschouwen, Oostkapelle, Valkenisse, Cadzand. N.B.: Lage Zwaluwe, Waalwijk, Riel, Oisterwijk, Haaren, Sint Michielsgestel, Best, Oirschot, Eindhoven, Vessem, Leende, Deurne, Helenaveen, Oss, Gassel. Lbg.: Milsbeek, Grubbenvorst, Griendsveen (gewoon, LEFFEF), Weert, Swalmen, Maalbroek, Montfort, Stein, Sittard, Amstenrade, Geulem, Neercanne, Gronsveld, Vijlen.

Variabiliteit. De typische vorm met geelachtige, soms iets rood getinte voorvleugels, zonder de rij donkere streepjes en zonder donkere bestuiving, is bij het ♂ zeldzaam (in Zoöl. Mus. slechts twee exemplaren van Amsterdam en Zevenhuizen). Bij het ♀ komen dergelijke exemplaren meer voor, zoals blijkt uit een serie van 14 stuks in het Zoöl. Mus., zodat die waarschijnlijk wel op vele plaatsen onder de soort aan te treffen zullen zijn.

f. *pilicornis* Haworth, 1812. De geelachtige vorm met de rij donkere streepjes, maar zonder opvallende donkere bestuiving op de voorvleugels, is verreweg het gewoonst.

f. *crassicornis* Haworth, 1812. Dezelfde vorm, maar met drie duidelijke donkere vegen op de voorvleugels (langs de voorrand, de middenader en de binnenrand) is niet zeldzaam en vrij verbreid onder de soort.

De dieren met roodachtige voorvleugels komen met dezelfde combinaties van tekening voor als die met geelachtige vleugels, wat bewijst, dat kleur en tekening zich onafhankelijk van elkaar gedragen. Maar steeds zijn de roodachtige vormen minder gewoon dan de overeenkomstige met geelachtige voorvleugels.

f. *rufescens* Tutt, 1891. De vorm met roodachtige ongetekende voorvleugels is beslist zeldzaam. In het Zoöl. Mus. slechts één ♂ (van Amsterdam) en vijf wijfjes (Amsterdam, Zevenhuizen en Pernis). Ongetekende mannetjes zijn dus steeds zeldzamer dan zulke wijfjes. Ik zag verder nog een exemplaar van Zaandam (WESTERNENG).

f. *cannae* Stephens, 1829. De vorm met roodachtige voorvleugels en met de rij zwarte vlekjes (maar zonder opvallende donkere bestuiving) is zowel bij ♂ als ♀ gewoon.

f. *rufescens-suffusa* Tutt, 1891. De vorm met roodachtige voorvleugels en met de drie opvallende donkere vegen erop is niet zeldzaam en komt wel overal onder de soort voor.

f. **albescens** nov. Grondkleur van voor- en achtervleugels witachtig. Marknesse, ♂, 30.VIII.1959 (holotype), Heemstede, Slijk-Ewijk (VAN DE POL).

[Ground colour of fore and hind wings whitish.]

f. **centripuncta** nov. Op de bovenzijde van de voorvleugels bevindt zich aan het einde van de middencel een zwarte stip. Lelystad, ♀, 17.IX.1961 (holotype) plus een tweede exemplaar van dezelfde vindplaats (VAN DE POL).

[On the upper side of the fore wings is a black point at the end of the cell.]

f. *strigata* Rebel, 1910. De vorm waarbij de zwarte vlekjes tot een doorlopende zigzaglijn met elkaar verbonden zijn, is zowel bij ♂ als ♀ niet zeldzaam.

f. *lechneri* Rebel, 1910. De voorvleugels zijn dicht donker bestoven, zodat hoogstens een paar lichte striemen overblijven, terwijl de achtervleugels eenkleurig donkergrijs zijn, soms nog met een rij postdiscale zwarte stipjes. Het holotype is afgebeeld op plaat 12 fig. 9. Een niet al te zeldzame vorm. Behalve het holotype van Zevenhuizen bevinden zich in het Zoöl. Mus. ook enige exemplaren van Grollo, Halfweg, Haamstede en Leende (VAN AARTSEN en LEFFEF leg.). Verder bekend van Harlingen, Marknesse, Lelystad, Slijk-Ewijk (VAN DE POL); Amsterdamse Bos (PEERDEMAN); Meijendel (LUCAS); Bergeijk (VAN WISSELINGH). De vorm komt in beide geslachten voor. Het Zoöl. Mus. bezit ook één exemplaar met roodachtige grondkleur. Een ♂ van Lelystad is extreem donker bestoven, terwijl ook het abdomen zwartachtig is (VAN DE POL).

[The description by REBEL is not correct owing to the poor execution of the plate to which REBEL refers in his original description. The holotype which is in the collection of the Amsterdam Zoological Museum, is figured on plate 12 fig. 9. As may be seen it has the fore wings densely powdered with dark scales leaving only a few paler streaks, whereas the hind wings are of a uniform dark grey. The form also occurs with specimens with reddish fore wings (markings and ground colour are completely independent from each other in this species) and the hind wings may also show a row of postdiscal black little stripes.]

f. **nervosa** nov. Alle aderen op de bovenzijde van de achtervleugels zijn donker van kleur. Lelystad, ♀, 12.X.1962 (holotype, VAN DE POL).

[All nervures on the upper side of the hind wings are of a dark colour.]

Dwergen. Niet zeldzaam. De exemplaren zijn soms niet groter dan een *Mythimna.*

Sedina Urbahn

Sedina büttneri Hering. *Tijdschr. Entom.* 95: 277; Cat. XI: (888). Sinds de ontdekking van de soort in ons land in 1948 zijn geleidelijk aan wat meer vindplaatsen bekend geworden, die zeer verspreid liggen over het midden en zuiden van het land. Het dier blijft echter nog steeds een zeldzaamheid, wat mogelijk ten dele veroorzaakt wordt door de late vliegtijd.

Enkele nieuwe gegevens zijn gepubliceerd over het omringende gebied. HOFFMEYER geeft in de tweede druk van „De Danske Ugler" (1962: 282), o.a. vindplaatsen op Bornholm en Seeland op. In Oost-Holstein werd *büttneri* in 1958 bij de Lanker See gevonden, terwijl in 1951 en 1958 in totaal vijf exemplaren uit de omgeving van Hamburg bekend werden (WARNECKE, *Bombus* 2: 68, 1959). In België werden in 1956 drie stuks bij Ninove (Oost-Vlaanderen, ten zuiden van Aalst) gevangen. De enige Engelse vindplaats blijft het eiland Wight, maar sinds de droogmaking van het moeras waar het dier voorkwam, is het er niet meer terug gevonden.

De vliegtijd blijft zoals reeds in 1953 werd vermeld: 9.IX—26.X.

In het hieronder volgende lijstje van vindplaatsen zijn ook de drie opgenomen, die reeds in Cat. XI werden vermeld, zodat men een volledig overzicht heeft van wat op het ogenblik bekend is.

Vindplaatsen. Ov.: Volthe, 9.IX.1950 (KNOOP, in collectie VAN DER MEULEN). Gdl.: Bennekom, 13.X.1953 (VAN DE POL); Slijk-Ewijk, 7.X.1960 en vier exemplaren in 1961 (dezelfde). Utr.: Zeist, 14.X.1953 (GORTER). N.H.: Heemstede, 22.IX.1955 (VAN DE POL). N.B.: Best, 27.IX.1961 (VAN AARTSEN, in Zoöl. Mus.); Eindhoven, 16. en 26.X.1948 (VERHAAK), 24.IX.1954 (HAANSTRA); Bergeijk, 3.X.1960 (VAN WISSELINGH); Helenaveen, 14.X.1963, drie stuks (LEFFEF). Lbg.: Sevenum, 27.IX.1954 (VAN DE BOL); Tegelen, 1.X. 1954 (dezelfde); Swalmen, 24.IX.1949 (GORTER, LÜCKER), 4.X.1950, 12, 13 en 15.X.1953 (PIJPERS); Rijckholt, IX.1956 (VAN DE POL).

Variabiliteit. f. **rufescens** nov. Grondkleur van de voorvleugels roodachtig. Bennekom (VAN DE POL); Helenaveen, ♂, 14.X.1963 (holotype, LEFFEF).

[Ground colour of the fore wings reddish.]

Arenostola Hampson

Arenostola phragmitidis Hübner. *Tijdschr. Entom.* 85: 75; Cat. VII: (402). Op droge gronden komt de vlinder natuurlijk weinig voor, maar op niet te natte groeiplaatsen van riet is hij in vrijwel het gehele land aan te treffen. Van de waddeneilanden is nog slechts één als vindplaats bekend.

De vliegtijd kan al eind juni beginnen, terwijl één vangst uit oktober bekend is, mogelijk een vertegenwoordiger van een zelden voorkomende partiële tweede generatie. De grenzen worden nu: 29.VI (in 1961 te Lelystad, VAN DE POL) tot 7.IX met als exceptionele laatkomer 8.X.1959 (LUCAS).

Vindplaatsen. Fr.: Terschelling (vrij algemeen, TANIS), Sexbierum, Ferwerd, Leeuwarden, Friens, Eernewoude, Oosterwolde, Nijetrijne (zeer talrijk, LEFFEF), Tjerkwerd, Hieslum. Gr.: Groningen, Noordlaren. Dr.: Peize, Zuidlaren, Wijster. Ov.: Volthe, Weerselo, Vriezenveen, Aadorp, Wiene, Elsen, Holten, Raalte, Abdij Sion, Frieswijk, Vollenhove, Marknesse. Flevoland: Lelystad. Gdl.: Epe, Wiessel, Teuge, Wageningen; Gorssel, Zutfen, Laren, Ruurlo, de Velhorst, Winterswijk, Korenburgerveen; Slijk-Ewijk, Ochten, Buren, Geldermalsen, Culemborg. Utr.: Jutphaas, Utrecht, Maarsseveen. N.H.: 's-Graveland, Naarden, Naardermeer, Weesp, Diemen, Amsterdamse Bos (gewoon, PEERDEMAN), Aalsmeer, Halfweg, Hembrug, Zaandam, Nek, Middelie, Beemster, Hoorn, Schoorl, Bergen, Overveen, Aerdenhout. Z.H.: Woerdense Verlaat, Noorden, Oegstgeest, Wassenaar, Meijendel, Delft, Staelduin, Capelle aan den IJssel, Schelluinen, Arkel, Hendrik-Ido-Ambacht, Oostvoorne, Hellevoetsluis, Middelharnis, Sommelsdijk, Melissant, Ouddorp. Zl.: Haamstede, Westenschouwen, Oostkapelle, Valkenisse, Cadzand. N.B.: Bergen op Zoom, Waalwijk, Hilvarenbeek, Sint Michielsgestel, Best, Nuenen, Bergeijk, Valkenswaard, Schaft, Asten, Someren, Helenaveen, Sint Anthonis, Gassel. Lbg.: Swalmen, Griendsveen (talrijk, LEFFEF), Montfort, Epen.

Variabiliteit. De typische vorm, zoals die door HÜBNER afgebeeld is, heeft lichte voorvleugels met brede rode achterrand. Zulke exemplaren zijn ongetwijfeld grote zeldzaamheden, tenminste bij ons. Meestal is een vrij flauwe niet te brede roodachtige tint langs de achterrand te zien, die al gauw geleidelijk in de lichte grondkleur overgaat. Ook zulke exemplaren beschouw ik als typisch.

In deze zwakkere vorm is de typische *phragmitidis* niet al te zeldzaam, tenminste bij het ♂, waarvan zich in het Zoöl. Mus. een serie van 15 stuks bevindt. Bij het ♀ komt hij veel minder voor: slechts drie stuks van Nigtevecht, Amsterdam en Breda.

f. *pallida* Tutt, 1888. De vorm met eenkleurig lichte voorvleugels is verreweg het talrijkst.

f. *rufescens* Tutt, 1888. De vorm met eenkleurig roodachtige voorvleugels is vrij zeldzaam, maar blijkbaar wel verbreid onder de soort. Ik zag alleen mannetjes. Tjerkwerd (MULDER); Lelystad, Bennekom, Slijk-Ewijk (VAN DE POL); Ankeveen, Woerdense Verlaat, Best (Zoöl. Mus.); Weesp (VAN TUIJL); Bussum (TER LAAG); Noorden (LUCAS); Schelluinen (SLOB); Arkel (ZWAKHALS); Hendrik-Ido-Ambacht (BOGAARD); Sommelsdijk (VROEGINDEWEIJ); Bergeijk (VAN WISSELINGH).

f. *olivescens* Warren, 1911. De vorm met olijfgrijze voorvleugels (donkerder dus dan bij f. *pallida*) en donkergrijze achtervleugels is blijkbaar nogal zeldzaam, maar komt bij beide geslachten voor. Noordlaren, Lelystad, Slijk-Ewijk (alle mannetjes, VAN DE POL). Daarentegen bevat de collectie van het Zoöl. Mus. op het ogenblik slechts drie wijfjes van Hilversum, Amsterdam en Halfweg.

f. **suffusa** nov. De brede baan langs de achterrand van de voorvleugels, die bij de typische vorm roodachtig is, is donkergrijs, evenals de achtervleugels. Lelystad, ♂, 10.VII.1961 (holotype, VAN DE POL).

[The broad band along the outer margin of the fore wings, which is reddish with the type form, is dark grey; hind wings of the same dark grey colour.]

Dwergen. Tjerkwerd (MULDER); Weesp (VAN TUIJL); Ouddorp (HUISMAN)

Coenobia Stephens

Coenobia rufa Haworth. *Tijdschr. Entom.* 84: 343; Cat. VI: (391). De vlinder is vrij verbreid in vochtige terreinen, maar over het algemeen is het toch geen gewone soort, zoals ook wel blijkt uit het betrekkelijk kleine aantal nieuwe vindplaatsen (al is heel wat meer dan wat in 1941 bekend was).

De vliegtijd kan tot ver in de tweede helft van augustus duren. De uiterste data worden nu: 1.VII—26.VIII. De laatste datum werd in 1954 door LUKKIEN vastgesteld.

V i n d p l a a t s e n. Fr.: Eernewoude, Nijetrijne. Dr.: Peize, Vries, Schoonlo, Odoorn, Dwingelo, Havelte. Ov.: Almelo, Saasveld (Molenven), Ommen. Gdl.: Harskamp, Bennekom; Neede, Korenburgerveen. Utr.: Amerongen, Botshol. Z.H.: Woerdense Verlaat, Noorden, Oostvoorne. N.B.: Kampina, Best, Nuenen, Bergeijk, Someren, Asten, Deurne, Helenaveen, Sint Anthonis. Lbg.: Venlo, Steijl, Swalmen, Maalbroek, Heel, Montfort, Peij.

V a r i a b i l i t e i t. Als typisch kunnen alle exemplaren met roodachtig getinte voorvleugels beschouwd worden. W. P. CURTIS wijdt een vrij uitvoerig artikel aan de vraag wat nu eigenlijk de kleur is van de typische vorm van *rufa* (*Ent. Rec.* 74: 130—134, 1962). Hij komt tot de conclusie, dat dit een vorm moet zijn met kaneelbruine voorvleugels, maar ik geloof niet dat dit juist is, nog afgezien van de vraag, of een dergelijke vorm wel bestaat. Raadpleegt men HAWORTH's Lep. Brit., dan ziet men, dat hij diverse roodachtige tinten aanduidt als „*rufis*". Het lijkt me dan ook beter zo een term zo ruim mogelijk op te vatten.

Exemplaren met roodachtig getinte voorvleugels ken ik van Vries, Vriezenveen (VAN DER MEULEN); Odoorn (PEERDEMAN); Hatert (VAN WISSELINGH); Kortenhoef (zes stuks!), Woerdense Verlaat, Oisterwijk (Zoöl. Mus.); Noorden, Deurne (LUCAS).

f. *fusca* Bankes, 1909, *Ent. Rec.* 21: 4. Grondkleur van de voorvleugels donker bruinachtig. Montfort (MAASSEN).

f. *despecta* Treitschke, 1825. De vorm met licht bruinachtige voorvleugels komt overal onder de soort voor.

f. *pallida* Tutt, 1888. De vorm met witachtig grijze voorvleugels komt inderdaad het meest voor.

CORRIGENDA

Supplement III

p. (170), regel 5 van boven, VI moet zijn: IV.

Supplement IV

p. (179), regel 22 van onderen, juni moet zijn: juli.
p. (199), regel 2 van boven, decennia moet zijn: decaden.

Supplement V

p. (270), regel 11 van onderen, pl. 22 moet zijn: pl. 89.

Supplement VII

p. (438), regel 16 van onderen, f. *fuscofasciata* moet worden: f. contrasta nov. (nec f. *fuscofasciata* Cockayne, 1951, *Ent. Rec.* 63: 30, pl. II, fig. 4).

Supplement IX

p. (576), regel 9 van onderen, Boisduval moet zijn: Duponchel.
p. (580). In treating the geographic variation of *Lycophotia porphyrea* I wrote, that the correct subspecific name for the variegated form of northwestern Europe (including the Netherlands) is subsp. *ericae* Haworth. But Mr. D. S. Fletcher kindly drew my attention to two names of Fabricius, which are older than the one given by Haworth, viz. *Noctua picta* Fabr., 1793, Ent. Syst. 3 (2): 91, from Germany, and *Noctua arnicae* Fabr., l. c.: 107, from Sweden. As Germany is not inhabited by a uniform subspecies, and as the type specimen is almost certainly lost (cf. Ella Zimsen, 1964, The type material of I. C. Fabricius: 570), it is not possible to make much use of the name *picta*.

As regards the Swedish form, I received a series from the Naturhistoriska Riksmuseum in Stockholm, two specimens of which are figured on plate 14 fig. 13 and 14. This series is perfectly identical with the subspecies flying in Great Britain and in the Netherlands, so that in my opinion the correct name for the more variegated subspecies (compared with the more unicolorous one of Central Europe) is *Lycophotia porphyrea arnicae* Fabricius.

M. Ch. Boursin pointed out to me, that de Villers did not describe his *Phalaena varia* from Brest, but from La Bresse in eastern France, between Lyon and Dijon, so that my conclusion that *varia* is the correct name for the reddish form from western France is wrong.

Supplement X

p. (637), regel 12 van boven, *Hadena lepida* Esper, [1790], moet zijn: *Hadena perplexa* Schiff., 1775. Zie Ch. Boursin, Errata et Addenda etc., *Bull. Soc. Linn. de Lyon* 34: 183 (1965).

regel 8 van onderen, Boisduval moet zijn: Duponchel.

p. (643), regel 1, *Lasionycta* Aurivillius moet zijn: *Hada* Billberg.

regel 2, *Lasionycta nana* moet zijn: *Hada nana.*

p. (689), regel 3 van onderen, *Meliana* Curtis moet zijn: *Sentha* Stephens.

regel 2 van onderen, *Meliana flammea* moet zijn: *Sentha flammea.* Zie Ch. Boursin, l. c.

Supplement XI

p. (699), regel 6, Cucullinae moet zijn: Cuculliinae.

p. (709). The variegated subspecies of *Lithophane lamda* Fabr. from western Europe is universally indicated as subsp. *zinckenii* Treitschke. Dr. G. Kruseman kindly pointed out to me, however, that this name is invalid, according to art. 72 d of the Int. Rules of Zoological Nomenclature, which reads: "If an author proposes a new specific name expressly as a replacement for a prior name, but at the same time applies it to particular specimens, the type of the replacement nominal species must be that of the nominal species, despite any contrary designation of type-specimen or different taxonomic usage of the replacement name".

I therefore propose to name the subspecies which up till now has been indicated as subsp. *zinckenii,* subsp. variegata nov., with as holotype the ♂ from Putten (Gelderland prov.), 13.X.1914, figured in *Tijdschr. Entom.* 107, pl. 30 fig. 3, 1954 (collection Zoological Museum Amsterdam).

p. (713), regel 3 van onderen, *Griposia* Tams moet zijn: *Dichonia* Hübner.

regel 2 van onderen, *Griposia aprilina* moet zijn: *Dichonia aprilina.* Zie Ch. Boursin, l. c., p. 184.

p. (717), regel 7 van boven, *albilinea* nov. moet zijn: *albilinea* Hoffmeyer & Knudsen, 1938, De Danske Storsommerfugle: 144.

p. (772), regel 12 van onderen, Vieweg moet zijn: Esper.

Plaat 29. Aan de tekst toevoegen: Fig. 15—17. *Conistra vaccinii* L. 15. f. *bicolor* Lempke, Hilversum, ♂, 8.XI.1938 (holotype). 16. f. *auronigra* Heylaerts, Breda, ♂, 3.X.1887 (holotype). 17. f. *conspicua* Lempke, Putten, ♀, 29.X.1918 (holotype).

Foto J. HUISENGA

Fig. 1. *Amphipyra perflua* F., ♀, De Bilt, 21.VIII.1913. Fig. 2. *Talpophila matura* Hufn., f. *obscura* nov., ♂, Bergeijk, 5.VIII.1961. Fig. 3. *Rusina ferruginea* Esper, f. *demacculata* nov., ♂, Bergeijk, 7.VII.1961 (holotype). Fig. 4. *Cosmia trapezina* L., f. *fasciata* Erschoff, ♂, Saasveld (Molenven), 7.VIII.1958. Fig. 5, 6. *Phlogophora meticulosa* L. 5. f. *flavescens* Saundby, ♂, Amsterdam, 20.IX.1902. 6. f. *westi* Chalmers-Hunt, ♀, Amersfoort, 22.IX.1952. Fig. 7, 8. *Euplexia lucipara* L. 7. f. *obscura* nov., ♂, Heemskerk, 16.VI.1961. 8. f. *pallida* Lempe, ♂, Oostkapelle, 7.VII.1959. Fig. 9, 12. *Cosmia affinis* L. 9. ♀, Domburg, 17.VII. 1912. 12 f. *bredemanni* Warnecke, ♂, Valkenisse, 29.VII.1963. Fig. 10, 13. *Cosmia diffinis* L. 10. ♂, Voerendaal (Cortenbach), 7.VIII.1935. 13, f. *pallescens* nov., ♂, Geulem, 4.VIII. 1954 (holotype). Fig. 11, 14. *Cosmia pyralina* Schiff. 11. ♂, Twello, 15.VII.1927. 14. f. *obscura* Hoffmann, ♂, Eext, 13.VII.1964

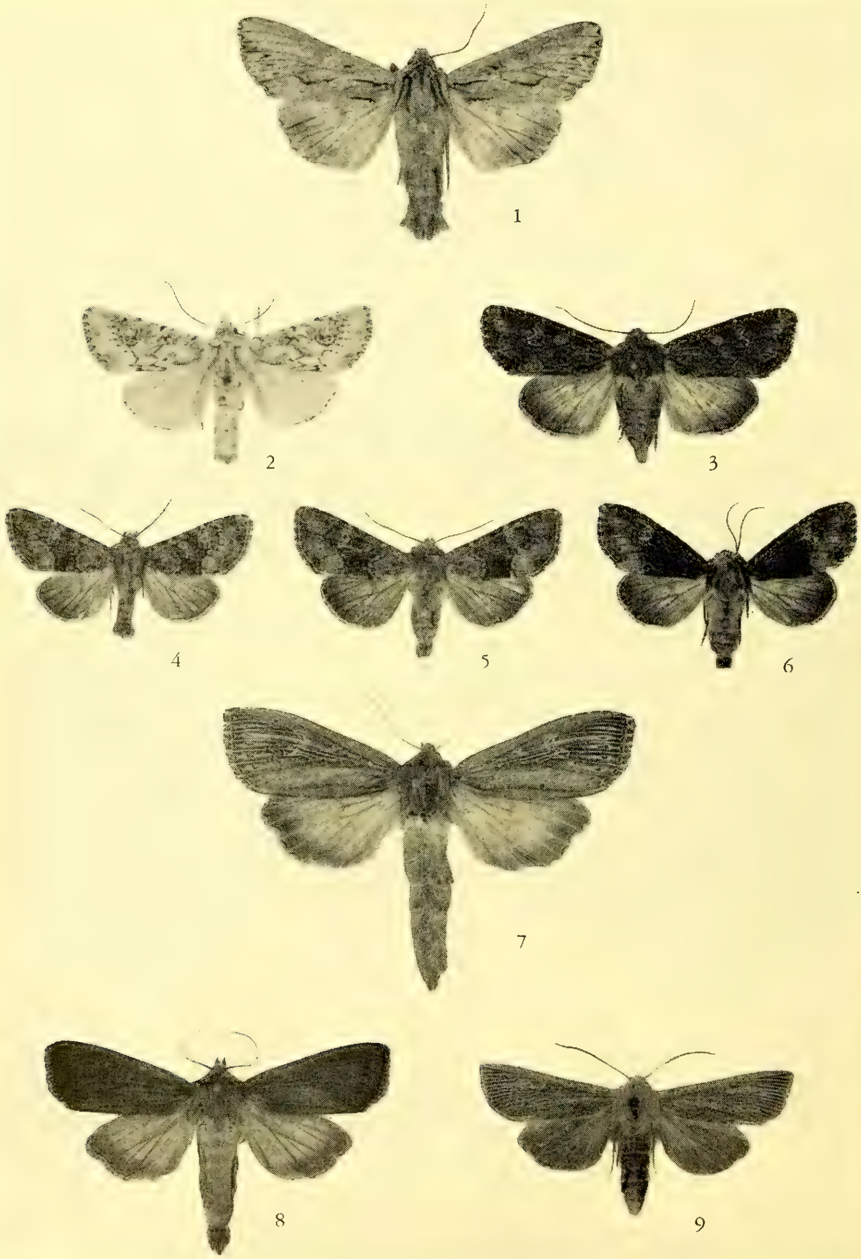


Foto J. HUISENGA

Fig. 1. *Apamea monoglypha* Hufn., f. *obsoleta* nov., ♂, Amsterdam, 8.VII.1932 (holotype). Fig. 2, 3. *Apamea anceps* Schiff. 2. f. *lactea* Cockayne, ♂, Texel, 4.VI.1939. 3. f. *nigrescens* Hannemann, ♀, Bergeijk, 11.VI.1964. Fig. 4—6. *Apamea illyria* Freyer. 4. ♂, Pitztal, Teriol. sept., 12—30.VI.1952. 5. ♀, Ziegelrodaer Forst, Hermannsecke, Krs. Querfurt (Oost-Duitsland), 30.V.1964. 6. f. *nigrescens* Lempke, ♀, Vaals, 17.V.1953 (holotype). Fig. 7, 8. *Nonagria typhae* Thunberg. 7. f. *fraterna* Borkhausen, ♂, Arkel, 10.IX.1962. 8. f. *obscura* nov., ♂, Leeuwarden, 9.VIII.1951. 9. *Rhizedra lutosa* Hb., f. *lechneri* Rebel, ♂, Zevenhuizen, 29.IX.1897 (holotype)

Foto J. HUISENGA

Fig. 1. *Oligia strigilis* L., f. *pallida* nov., ♀, Ankeveen, 30.VI.1907 (holotype). Fig. 2. *Oligia latruncula* Schiff., f. *fasciata* Lempke, ♀, Bergen-N.H. (Oostdorp), 21.VI.1938. Fig. 3—6. *Mesoligia furuncula* Schiff. 3. f. *vinctuncula* Hübner, ♂, Aalten, 28.VII.1935. 4. f. *unicolor* Warren, ♂, Hilversum, 10.VII.1940. 5. f. *constricta* Heydemann, ♂, Valkenisse, 24.VII.1961. 6. f. *centrifasciata* nov., ♂, Bergeijk, 21.VIII.1960 (holotype). Fig. 7—9. *Oligia versicolor* Borkhausen. 7. ♂, Nuenen, 20.VI.1961. 8. f. *fasciata* Lenz, ♂, Winterswijk, 20.VI.1952. 9. f. *aethiops* Heydemann, ♀, Nuenen, 3.VIII.1962. Fig. 10—12. *Photedes minima* Haworth. 10. ♂, Best, 17.VII.1963. 11. f. *obscura* nov., ♂, Best, 17.VII.1963 (holotype). 12. f. *obscura* nov., ♀, Swalmen, 30.VI.1964. Alle figuren, behalve 10 en 11, × 1½ (All figures, except 10 and 11, × 1½)

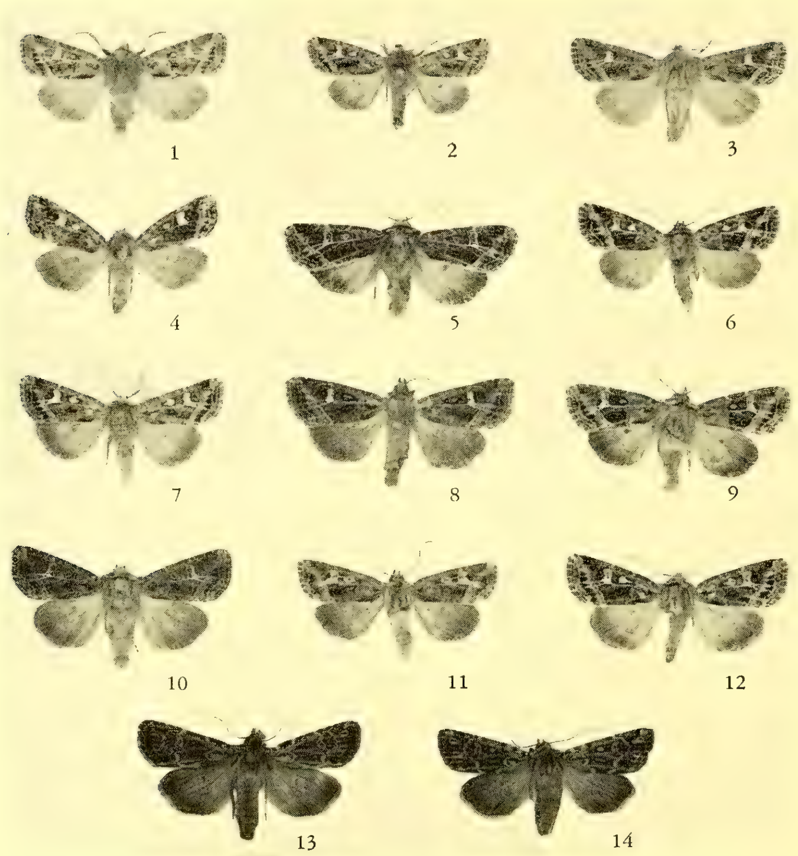


Foto J. HUISENGA

Fig. 1—3. *Celaena haworthii haworthii* Curtis. 1. ♂, Norfolk Broads, 13.VIII.1921. 2. ♂, Aberdeenshire, 1893. 3. ♂, Aberdeenshire, 1895. Fig. 4—12. *Celaena haworthii erupta* Germar. 4. ♀, Waren (Mecklenburg). 5. ♂, Griendsveen, VIII.1964. 6. ♀, idem, 7. f. *grisescens* nov., ♀, idem (holotype). 8. f. *nigrescens* nov., ♂, idem (holotype). 9. f. *virgata* nov., ♂, idem (holotype). 10. f. *unicolor* nov., ♂, idem (holotype). 11. f. *semiconfluens* nov., ♂, idem (holotype); 12. f. *protensa* nov., ♂, idem (holotype). Fig. 13, 14. *Lycophotia porphyrea arnicae* Fabricius. 13. ♂, Ornäsudden, Holmsted (Zweden), 20.VII.1954. 14. ♀, idem

Foto J. Huisenga

Fig. 1, 2. *Trachea atriplicis* L. 1. ♀, Apeldoorn, 4.VI.1957. 2. f. *nigrescens* nov., ♂, Onnen, 16.VI.1961 (holotype). Fig. 3, 4. *Apamea sublustris* Esper. 3. ♀, Overveen, 21.VI.1964. 4. f. *obsoleta* nov., ♂, Aerdenhout, 9.VII.1955 (holotype). Fig. 5—10. *Arenostola fluxa* Hübner. 5. ♂, Slijk-Ewijk, 4.VII.1960. 6. f. *pulverosa* Warren, ♂, Slijk-Ewijk, 6.VII.1961. 7. f. *hellmanni* Eversmann, ♂, Slijk-Ewijk, 18.VII.1961. 8. ♂, Valkenisse, 27.VII.1961. 9. f. *pulverosa* Warren, ♂, Heemskerk, 30.VIII.1962. 10. f. *hellmanni* Eversmann, ♂, Egmond aan den Hoef, 22.VII.1950. [The specimens from Slijk-Ewijk (Gelderland prov., on the river Waal), are distinctly larger than those from the dune area along the North Sea]

TIJDSCHRIFT VOOR ENTOMOLOGIE

Het verschijnt in één deel van 350—450 bladzijden per jaar, bestaande uit enkele afleveringen.

ENTOMOLOGISCHE BERICHTEN

Deze zijn bestemd voor de publicatie van kortere artikelen, faunistische notities etc., alsmede van de Verslagen der Vergaderingen en van mededelingen van het bestuur. Zij verschijnen twaalf maal per jaar in een aflevering van 16 of meer bladzijden, die samen een deel vormen.

TRICHOPTERORUM CATALOGUS

Deze Catalogus van F. C. J. Fischer wordt door de Vereeniging voor rekening van de auteur uitgegeven. Alle bekende recente en fossiele soorten van de gehele wereld met hun synoniemen worden er in behandeld. Delen I en II kosten f 39.— per stuk, delen III—V: f 45.—. Er zullen in totaal 15 delen verschijnen. Van alle delen zijn ook éénzijdig bedrukte exemplaren beschikbaar. De prijsverhoging hiervoor bedraagt f 2.50.

ENTOMOLOGIA EXPERIMENTALIS ET APPLICATA

Dit tijdschrift wordt uitgegeven door de Noord-Hollandse Uitgevers Maatschappij te Amsterdam in opdracht van de Vereeniging. Het publiceert artikelen over experimentele biologie en oekologie bij insecten en andere land-arthropoden. Het verschijnt vier maal per jaar en bevat 320 bladzijden. De prijs voor leden bedraagt f 25.—, voor niet-leden f 40.— per jaar.

Alle zakelijke correspondentie betreffende de Vereeniging te richten aan de Secretaris, W. Hellinga, Weesperzijde 23II, Amsterdam-O.

Alle correspondentie over de redactie van het Tijdschrift voor Entomologie en de Monographieën te richten aan de Redacteur, Dr. A. Diakonoff, Rijksmuseum van Natuurlijke Historie, Leiden.

Alle correspondentie over de redactie van de Entomologische Berichten te richten aan de Redacteur, B. J. Lempke, Oude IJselstraat 12III, Amsterdam-Z. 2.

Alle correspondentie over de redactie van Entomologia Experimentalis et Applicata te richten aan de Redacteur, Dr. P. A. van der Laan, Lab. voor Toegepaste Entomologie, Linnaeusstraat 2 B, Amsterdam.

Alle betalingen te richten aan de Penningmeester, Drs. H. Wiering, Doorntjes 29, Bergen (N.H.), postgiro 188130, ten name van de Nederlandsche Entomologische Vereeniging te Bergen (N.H.).

Alle correspondentie betreffende de Bibliotheek der Vereeniging te richten aan de Bibliotheek, Zeeburgerdijk 21, Amsterdam-O.

NOTICE TO SUBSCRIBERS

All correspondence referring to subscriptions and exchange of the periodicals of the Netherlands Entomological Society should be addressed to the Librarian, Zeeburgerdijk 21, Amsterdam-O, Netherlands.

NOTICE TO CONTRIBUTORS

Contributors will receive free of charge fifty reprints of their papers, joint authors have to divide this number between them at their discretion. Additional reprints may be ordered when returning proofs.

Manuscripts should be written in Dutch, English, French, German or Italian. If they contain descriptions of new genera, species, etc., they should be in one of the four last mentioned languages.

The author should communicate with the editor before submitting his manuscript. He will enclose with manuscript a Synopsis (Abstract), styled according to recommendations of the UNESCO (style rules will be provided by the editor) and, if needed, a Summary. Papers in Dutch should contain an Abstract and/or a Summary in one of the four other languages.

Manuscripts should be typewritten in double spacing on only one side of the paper, with a margin of at least three cm at the left side of each sheet. Paragraphs should be indented. Carbon copies cannot be accepted, as handling makes them illegible.

Captions for text figures and plates should be written on a separate sheet in double spacing, numbered consecutively in arabic numerals; the use of a, b, c, or any other subdivision of the figure numbering should be avoided.

Drawings for reproduction should be on good paper in Indian ink, preferably at least one and a half times as large as the ultimate size desired. Lettering should be uniform, and, after reduction, of the same size. Photographs should be furnished as shiny positive prints, unmounted. Plates should be arranged so as to fill a whole page (11.5 x 19 cm) of the *Tijdschrift,* or a portion thereof, captions included. Combinations of illustrations into groups are preferable to separate illustrations, since there is a minimum charge per block.

Names of genera and lower systematic categories, new terms and the like are to be underlined by the author in the manuscript by a single straight line. Any other directions as to size or style of the type are given by the editors, not by the author. Italic type or spacing to stress ordinary words or sentences is to be avoided. Dates should be spelled as follows: either "10.V.1948" or "10 May, 1948". Other use of latin numerals should be avoided, as well as abbreviations in the text, save those generally accepted. Numbers from one to ten occurring in the text should be written in full, one, two, three, etc. Titles must be kept short. Footnotes should be kept at a minimum.

Bibliography should not be given in footnotes but compiled in a list at end of the paper, styled as follows:

Mosley, M. E., 1932, "A revision of the European species of the genus *Leuctra* (Plecoptera)". — Ann. Mag. Nat. Hist. [10] 10 (3): 1—41, pl. 1—5, fig. 1—57. Number of issue should only be added (in parentheses) when it has individual pagination.

Text references to this list might be made thus:

"Mosley (1932) says...." or "(Mosley, 1932)".

The editors reserve the right to adjust style to certain standards of uniformity.

Manuscripts and all communications concerning editorial matters only should be sent to: Dr. A. Diakonoff, Rijksmuseum van Natuurlijke Historie, Leiden, The Netherlands.

DEEL 108 AFLEVERING 11 1965

TIJDSCHRIFT VOOR ENTOMOLOGIE

UITGEGEVEN DOOR

DE NEDERLANDSCHE ENTOMOLOGISCHE VEREENIGING

INHOUD:

Tijdschrift voor Entomologie, deel 108, afl. 11 Gepubliceerd 30-XII-1965

Nederlandsche Entomologische Vereeniging

Bestuur

Prof. Dr. J. van der Vecht, *President* (1961—1967), Oegstgeest.
Dr. G. Barendrecht, *Vice-President* (1965—1971), Amsterdam.
W. Hellinga, *Secretaris* (1963—1969), Amsterdam.
Drs. H. Wiering, *Penningmeester* (1962—1968), Bergen (N.H.).
Drs. C. A. W. Jeekel, *Bibliothecaris* (1960—1966), Amsterdam.
J. A. Janse (1964—1970), Bennebroek.
Dr. A. F. H. Besemer (1965—1970), Bennekom.

Commissie van Redactie voor de Publicaties

Prof. Dr. J. van der Vecht (1961—1967), Oegstgeest.
P. Chrysanthus (1964—1967), Oosterhout (N.B.).
Dr. A. Diakonoff (1964—1967), Leiderdorp.
G. L. van Eyndhoven (1963—1966), Haarlem.
Dr. L. G. E. Kalshoven (1964—1967), Blaricum.
Prof. Dr. D. J. Kuenen (benoemd 1957), Leiden.
Dr. P. A. van der Laan (benoemd 1957), Bennekom.
B. J. Lempke (1965—1968), Amsterdam.
Prof. Dr. J. de Wilde (benoemd 1957), Wageningen.
Dr. J. T. Wiebes (1963—1966), Leiden.

Bestuur der Afdeling voor Toegepaste Entomologie

Dr. A. F. H. Besemer, *Voorzitter*, Wageningen.
Ir. P. Gruys, *Secretaris,* Rheden.
Dr. Ir. L. Bravenboer, Naaldwijk.
Dr. C. F. A. Bruyning, Oegstgeest.
Dr. Ir. J. B. M. van Dinther, Bennekom.

De contributie voor het lidmaatschap bedraagt f 15.—, voor student-leden f 2.50, per jaar. — Begunstigers betalen jaarlijks tenminstet f 15.—.

De leden, behalve de student-leden, ontvangen gratis de *Entomologische Berichten,* waarvan de prijs voor student-leden f 1.50 per jaar, voor niet-leden f 20.— per jaar en f 2.— per nummer bedraagt.

De leden kunnen zich voor f 10.— per jaar abonneren op het *Tijdschrift voor Entomologie*; hiervan bedraagt de prijs voor niet-leden f 35.— per jaar.

De eerder verschenen publicaties der Vereeniging zijn voor de leden tegen verminderde prijzen verkrijgbaar. De Vereeniging geeft de volgende publicaties uit.

Monographieën van de Nederlandsche Entomologische Vereeniging

Deze worden met onregelmatige tussenpozen uitgegeven. Er zijn reeds verschenen:

— F. T. Valck Lucassen et al. — Monographie du genre Lomaptera Gory & Percheron (Coleoptera, Cetoniidae), prijs f 50.—.

1. A. J. Besseling. — De Nederlandse Watermijten (Hydrachnellae Latreille, 1802), prijs f 25.—.

THE SPECIES-GROUP OF VESTALIS AMOENA SELYS, 1853, IN SUNDALAND (ODONATA, CALOPTERYGIDAE)

BY

M. A. LIEFTINCK

Rijksmuseum van Natuurlijke Historie, Leiden

Abstract

The present paper deals with a single section of the "Vestalis complex", which still presents a number of problems in classification. The most recent contribution to a general treatment, based on neural and penile characters, is the one given by May (1935), who recognized three genera, *Vestalis* Selys (1853) s.str., *Vestinus* Kennedy (1920a) and *Vestalaria* May (1935). Much of importance has since been added to our knowledge of these insects, with which both Kennedy and May were insufficiently acquainted. It was found that the sectional characters of *Vestinus* are almost as unstable as those separating the three vestaline genera distinguished by May, and that they exhibit characters of structure and venation which are variously mixed, leading over from one section (or series) to another. In view of this, there seems to be little reason for retaining generic of even subgeneric groupings within the limits of the basic genus *Vestalis.* A clarification of the taxonomy and relationship of the whole complex can not be undertaken before critical treatments of other species-groups have also been given. A detailed analysis of the section *Vestinus,* typified by *V. gracilis* (Ramb.), reveals that it is composed of different elements, at least one of its components, the well-known taxon *V. amoena* Selys, breaking up into 7 closely similar species. This group is centred in Sundaland, and in various places its members occur sympatrically. The sexes are similar and all species have uniformly coloured bodies and wings. Differences in venation and male penis structure are too slight to ensure species recognition. Reliable specific characters are almost exclusively found in the male anal appendages, which have proved remarkably constant; however, in the majority of species females have remained inseparable. The types of the most widely distributed species, *V. amoena* and of that of *beryllae* (Borneo) are redescribed, and definitions based on new characters are given of 6 new species, viz. *V. amethystina* (Malaya, Sumatra), *amaryllis, amabilis, amnicola, atropha* and *anacolosa* (all from Borneo). A key to the males is also given, the descriptions and notes that follow being accompanied by illustrations of the male reproductive organs. The main venational characteristics as well as detailed body-measurements are given for each taxon in tabular form. Special attention is drawn to the distribution records and maps. Sympatric occurrences in various parts of Sundaland are emphasized and tabulated separately. The paper is concluded with an illustrated account of the immature stages, which are compared with those of allied genera, the larvae of *Neurobasis* and *Echo* being also figured.

Introduction

The family Calopterygidae is represented in the Indo-Australian Archipelago only by three genera, viz. *Neurobasis* Selys, *Echo* Selys, and *Vestalis* Selys, all of them participating in the calopterygid fauna of the Asiatic mainland as well. *Neurobasis* comprises several polytypic species, which occur from India to China and through Sundaland eastwards far into the Papuan Region. *Echo,* on the other hand, occupies a much more restricted area, the distribution of the two regional species for some reason having been retarded, both being confined to the submontane zone

and hill forests of the Malay Peninsula and the island of Sumatra. With regard to *Vestalis,* it can be said that an analysis of all defined taxa and available material would result in an estimated total of about twenty recognizable species and subspecies distributed all over eastern Asia. Up to the present time, however, the genus only held two major species-groups each with three species, which have succeeded to spread in a southeastern direction into Sundaland. These are enumerated hereafter under A and B. Only a single insular species belonging to group A (*V. melania* Selys), has reached the Philippines, all others being abruptly brought to a halt before or at "Wallace's Line", as first defined by HUXLEY.

ED. MAY (1935) has divided the genus *Vestalis* in three units, which are characterized and treated by him as full genera. These are:

A. *Vestalis* Selys (1853), s.str., with three species: (1) the genotype *V. luctuosa* (Burm.), of Sumatra, Java and Bali; (2) *V. lugens* Selys, of Malaya (?), Sumatra and adjacent islands; and (3) *V. melania* Selys, of the Philippines. This comprises a group of conspicuously coloured species with broad, densely reticulated wings. All are sexually heterochromatic, males possessing deeply pigmented, beautifully iridescent wings.

B. *Vestinus* Kennedy (1920b), with four species: (1) the genotype *V. gracilis* (Ramb.) cum subsp., from India to Malaya; (2) *V. apicalis* Selys, terr. typ. "Inde or."; (3) *V. amoena* Selys, from somewhere in Sundaland; and *V. beryllae* Laidlaw, confined to Borneo. — A heterogeneous group of slender species with narrower wings and more open venation. Sexes isochromatic, wing-membrane frequently iridescent but poorly coloured.

C. *Vestalaria* May (1935), with three or more species, the genotype being *V. smaragdina* (Selys), from Assam. — Both sexes with hyaline wings, which are more broadly sessile and even less closely veined than in B.

In the next pages only the characters of the less strikingly coloured representatives of the section B, i.e., the cluster here called the "*Vestalis amoena* species-group" will be discussed in some detail, no further mention being made of *V. gracilis* and *apicalis,* for which *Vestinus* was originally proposed.

For a general survey of the entire group reference should be made to MAY (1935), and for the regional (Malaysian) members of the family to LIEFTINCK's "Handlist" (1954).

CRITERIA OF GENERIC DISTINCTION

MAY already admitted that *Vestalis, Vestinus* and his own new taxon *Vestalaria,* though re-defined and treated by him as full genera, are rather artificial units which cannot possibly be classified into 'primitive' or 'specialized' types. Indeed, any sequence indicating an evolutionary trend is virtuallly impossible because such a classification depends entirely on the criteria used. These criteria are still of a purely morphological nature, being found in the mouth-parts, penile structure, and wing venation. When considering the component parts of *Vestalis* in a broad sense, they show a curious mixture of allegedly generalized and advanced characters. For instance, as was pointed out to me by Mr. J. COWLEY in a personal communication,

the form of the clypeus affords a reliable character to distinguish between species or even species-groups. However, in *Vestalis* s.str., I have recently found that all three species not only possess a very differently shaped clypeus, but the structure of this part of the head in the genotype, *V. luctuosa,* is undifferentiated and almost exactly similar to that seen in the members of *Vestinus.*

As we will see, one species not quite fittingly assigned to the section *Vestinus,* i.e., *V. amoena* Selys, is itself a composite unit whose members have in common that their venational and penile characters are practically identical. With regard to the venation, it should be remembered that MAY separated his three genera on the basis of the origin of the veins M_3-M_4 and the breadth of the Cu_1-Cu_2 area. Now further investigations have proved that the characters employed by MAY

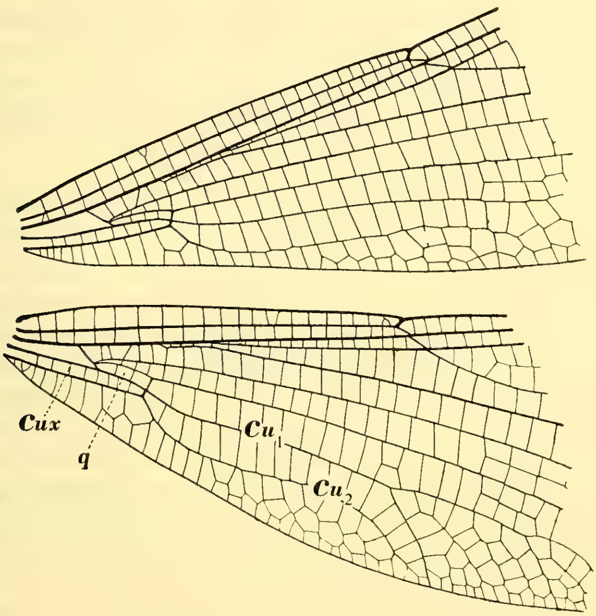


Fig. 1. *Vestalis amoena* Selys, ♀ from South Sumatra. Base of right pair of wings

should be used with caution. Within the limits of the species-group here treated, I found these neural characters to be unstable and leading over to the other two of MAY's genera in at least half of the members at present known. Fig. 1, of the basal part of the wings of *V. amoena,* may serve as an example of the wing venation characteristic for this cluster of forms. It is true that the wings of the rather aberrant *V. beryllae* are narrower than those of the rest but the venation conforms to the same plan. Despite the mainly unisexual characters which separate *V. beryllae* from the remainder, there can be no doubt that all of them are nearly related and are best kept together. If we were to accept *Vestinus* as generically distinct from *Vestalis* on neural characters alone, we would be obliged to detach not only the

compact *amoena*-group from the *gracilis* assemblage but *beryllae* as well, placing each of them in separate units, a conception to which I feel strongly opposed.

A divisional treatment here becomes still more complicated when the male penile organ is examined. Whereas the structure of the penis in the *amoena* group deviates but little from that of *gracilis,* this organ in *V. beryllae* is, remarkably enough, altogether different in shape from that of the rest. It would seem, therefore, equally unjustifiable to base any group characters on the penis structure alone.

Mr. J. COWLEY informs me in a letter that certain other sectional elements of *Vestalis,* examined by him some years ago, were also found to be composite and standing equally in need of re-adjustment.

Taking into account all above facts, I consider it unwise to recognize a great number of genera containing only a single or very few species. Until the genus in its broadest sense has been critically analysed and an adequate knowledge has been obtained of the taxonomic relations within its own limits, I prefer to employ the term species-group, the equivalent of RENSCH's "Artenkreis", for all sections so far denominated or presently recognized. I have not even adopted a subgeneric arrangement, the less so since little or nothing is yet known of the physiological requirements and ethology of the various components.

THE SPECIES-GROUP OF *V. amoena*

The most widely distributed amongst these is the insect hitherto called *Vestalis amoena* Selys, 1853. As hinted at already above, this well-known Malaysian taxon breaks up in a number of intimately allied yet clearly definable species. They bear a very close *prima facie* resemblance to each other, being approximately of the same size and having all of them the four wings uniformly tinted, a combination of features not shared by any of the other *Vestalis.* The sexes are similar and have the body of an intense emerald-green, the abdomen often rather more golden or bronze, and both possess semi-transparent wings with a delicate purplish or lilac iridescence. LAIDLAW (1915b) has described a close relative with similar characters from Borneo. This is *Vestalis beryllae* Laidlaw, chiefly remarkable by the great relative length of its abdomen, at least so in the male.

All members of the group are shade-loving jungle insects that breed in small streams and brooks. They are usually common where found, and juveniles may be found some distance from running water.

It is the purpose of the present paper (1) to establish the identity of the true *V. amoena* of HAGEN and DE SELYS and redescribe it; (2) to prove the existence of five near allies formerly confounded with it; and (3) to define one more species not previously known, belonging in the same group.

GENERAL CHARACTERIZATION AND SEGREGATION OF SPECIES

Both sexes of the collective taxon commonly referred to as *Vestalis amoena* auct. have been accurately described by DE SELYS (1853, 1873), DE SELYS & HAGEN (1854), and FRASER (1929, 1934).

As far as the general morphology, colour-pattern and wing venation are con-

cerned, the existing descriptions above alluded to are applicable to the entire group[1]).

All authors depended on the characteristic general appearance of this damselfly as sufficing to distinguish it from the rest; and since it is an ordinary-looking insect frequently represented in collections brought home from abroad, it was always taken to stand for a single somewhat variable species. So it could happen that since the time of the original description of *V. amoena,* the finer morphological structures, such as the male sexual organs, were left unnoticed. It is true that the male penile organ of the supposed "*amoena*" was figured and commented upon in some detail by SCHMIDT (1915) and KENNEDY (1920a), but this was done in treatments of a more general character in which sectional units were opposed and *Vestinus* was compared with the more remotely allied constituents of *Vestalis.* The same is true with regard to the venation of which even MAY (1935) was unable to supply any information owing to lack of material of the group.

The discovery of what seemed to be quite constant structural differences in the male anal appendages of these closely similar calopterygids, led me to accumulate as much material as possible and re-examine all available specimens previously assigned to *V. amoena.*

Brief mention may now be made of earlier records in the literature, with comments on the possible identity of the species involved.

In 1873 DE SELYS already commented on the considerable differences in size existing in a number of individuals he examined from the island of Labuan (NW Borneo). Subsequent examination of these animals showed them to represent two species, viz. *amoena* and *amaryllis.* HAGEN (1887) relates to a small series of females in his collection taken at Mindai and Dusson (?) in southeast Borneo. These specimens differed among themselves both in size and colour, one female being exceptionally small (abd. 34 mm, hind wing 30 mm) while in another the arculus sectors are said to be separated basally. I have not seen these insects but our specimens from southeast Borneo pertain to *amoena* Selys and *amaryllis* sp.n. LAIDLAW (1902) recorded *amoena* from Kuala Aring and Gunong Inas in the Malay Peninsula, remarking that they disagree in body and wing colour. The same author in 1903 reports both sexes from southern peninsular Siam (Patani) but gives no details. WILLIAMSON (1904) also recorded the occurrence of the species in Lower Siam (Trong, Khow Sai Dow Mountain, 1000 ft.), suggesting that the great amount of variation in colour was due to age and sex. I have not been able to examine material from just these localities, but the above specimens almost certainly are conspecific either with *amoena* and/or *amethystina,* or else with the unnamed insect discussed in this paper under "spec. indet." (p. 338). When, in 1915a, LAIDLAW discussed a series obtained by J. C. MOULTON on Mt. Kinabalu, the author was struck by the considerable differences in size exhibited by both sexes, the extremes noted by him in one series of males being 48—52 mm for the abdomen, 37—38.5 mm for the hind wing, whereas the rest of the males measured 44 and 34 mm, respectively. This led LAIDLAW to believe that the species presents

---

[1]) Except where some special condition demands mention of them, these general descriptions are not repeated in the specific characterizations which follow.

an example of "discontinuous variation" in both sexes, an untenable suggestion as we will presently see, the Mt. Kinabalu area being inhabited by three quite different species, viz., *amnicola, anacolosa,* and *beryllae.*

All remaining articles in which "*V. amoena*" is merely recorded without comment have been omitted from the bibliography at the end of this paper.

Penis structure. — This organ was figured and briefly described for one (or more) species of the *V. amoena* group by SCHMIDT (1915: 144, pl. 11 fig. 45) and KENNEDY (1920a: 29, fig. 46—47), and for related species-groups by MAY (1935: 214, fig. 12—16). The penis is difficult to figure adequately as its terminal parts are twisted and bent in various planes. All were examined in the dried state after relaxing pinned or papered specimens. It was repeatedly found, however, that the penes extracted from a small series of unquestionable conspecific males were nevertheless not exactly alike. It soon became clear that certain feebly sclerotised membranous parts showed various degrees of shrinkage in specimens representing different stages of maturity. In some *V. amaryllis* from SE Borneo, for instance, it was found that the limbus membranosus at the apex of the glans was either more or less saucer-shaped and of large size, or reduced to a tiny transverse plate, in others still this lobe being absent altogether. In fact, no two penes of a single species from one locality were absolutely alike as the folding varies and the terminal filaments may project at different angles.

The following brief description applies to all forms except *beryllae,* which has a differently shaped penis. Shaft long and curved, its convex surface sclerotised and strongly pigmented; provided on either side near its apex with a ridge-like outgrowth furnished with bristles, a row of lateral bristles also being present more basad and some way out beyond the position of the ridge. Glans penis with its distal part recurved; lamina interna conspicuous, placed transversely and curled inward; limbus membranosus very variable, usually short and ridge-like, occasionally of great size; distal portion provided with a pair of symmetrically placed, deeply bifid, thread-like filaments which are variously curved and twisted but about equally long, the outer branch being provided at its base with a strong, slightly pigmented, spine-like process. Specific differences in the general shape and in the form of the processes could not be detected; even if such differences do exist, they will probably prove too slight to be of diagnostic value. The penes of the three species here figured, viz. *V. amoena*, *amaryllis*, and *anacolosa* (fig. 2) are closely similar to those of all others, with the exception of *V. beryllae*. In the latter the apex of the penis shaft is furnished with a greater number of bristles which are shorter and finer than in the remaining species; here, also, the thickening of the lateral wall at the end of the shaft is replaced by a distinctly hairy, triangular lobe projecting laterad at a right angle. The complicated structure of the apical part of the glans penis of *V. beryllae* is probably best understood from a consultation of the camera lucida drawings I have made of it. A curved lamina interna is present but concealed from view by the greatly developed external branch of the apical process (fig. 10).

Females. — No serious attempt has been made to identify all available females specifically, because it appeared that any colour distinctions are complicated by

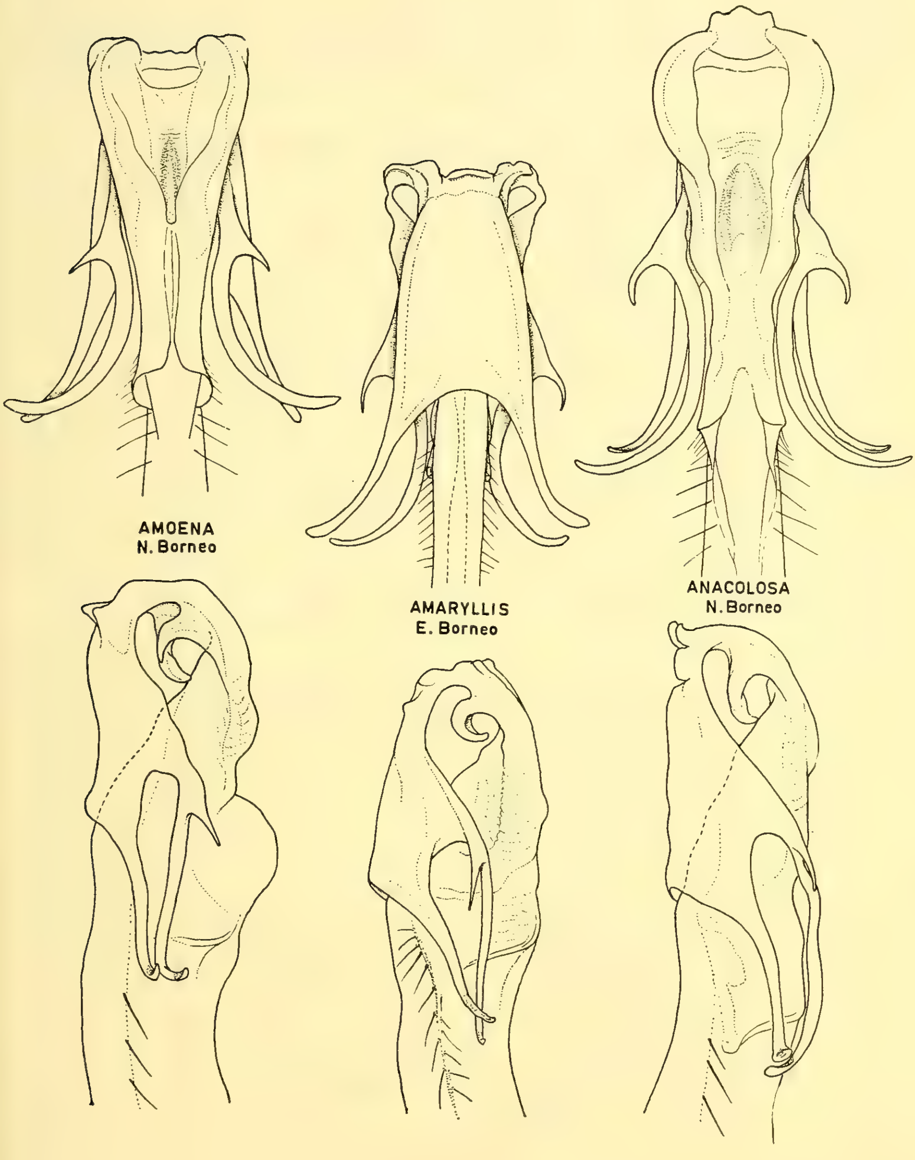


Fig. 2. Apical part of penis of *Vestalis* species. Upper row: dorsal view (*V. amoena* and *anacolosa*) and ventral view (*V. amaryllis*); lower row: right lateral view

differences due to maturity, and good series taken with their respective males are not available. See, however, under each species. Structural differences are not apparent, the form of the clypeus and prothorax as well as the armature of the terminal abdominal segments, valves and appendages being practically the same in all species. The existence of a minute "parorbital" tubercle situated posteriorly on

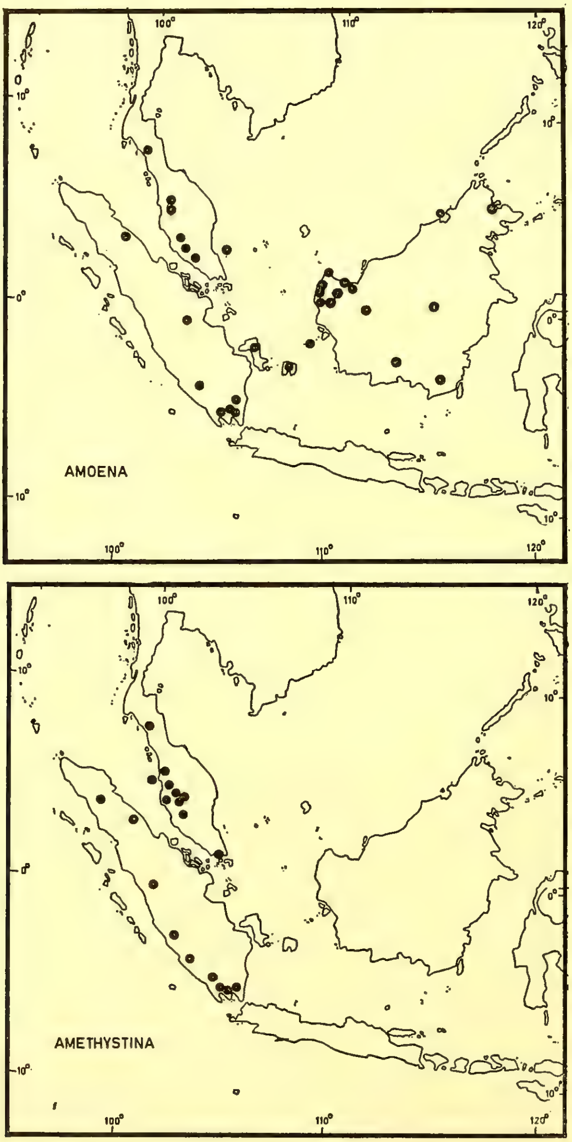


Fig. 3. Geographical distribution of the *Vestalis amoena* group in the Malaysian Subregion, showing all known localities for two species and their sympatric occurrence in the Malay Peninsula and Sumatra

either side at some distance from the inner border of the compound eye, which I first thought might be used as a means of separating species, proved to be individually variable. In a series of *V. amoena* from Borneo it was found to be present in all females, though occasionally poorly developed, while in Sumatran examples it was either extremely minute or absent altogether.

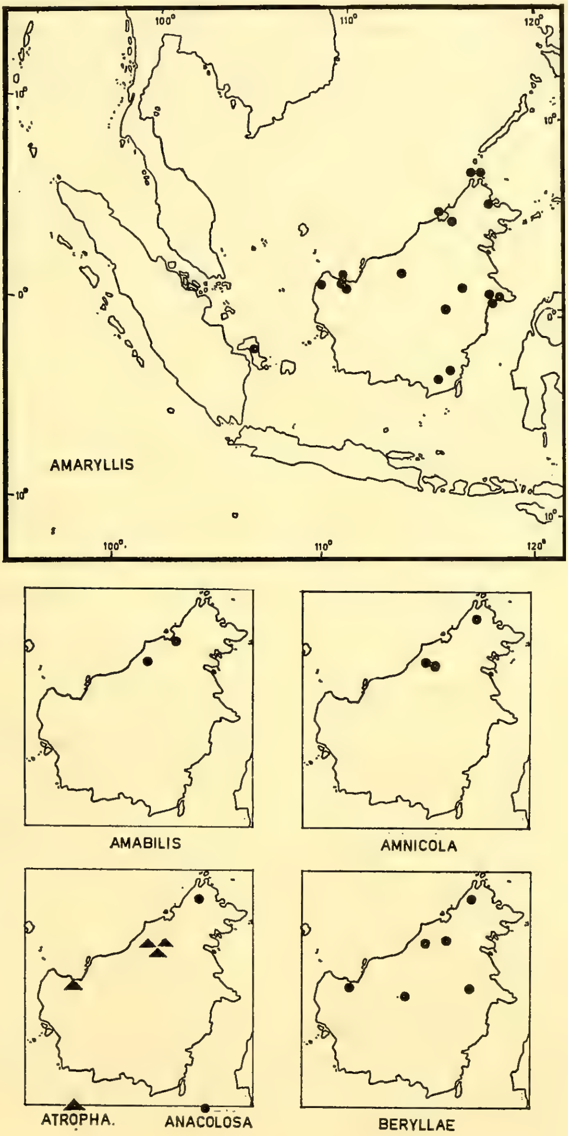


Fig. 4. Geographical distribution of six species of the *Vestalis amoena* group in the Malaysian Subregion, showing all known localities

Speciation and geographical distribution

As constituted at present the section *V. amoena* occupies, roughly, the area called the "Malaysian Subregion" [1]), or, speaking in geological terms, the land-mass known as Sundaland. In this particular case the limits of the distributional area are still more restricted and somewhat arbitrarily defined, because a notable exception is formed by the island of Java (and Bali) whence no species are known with certainty. For a possible explanation of the remarkable absence in Java, even of the wide-spread *V. amoena*, see under that species. The exact limits of a north-western extension of the group into Thailand and Lower Burma are still unknown.

According to the evidence of present-day distribution and specific differentiation, it would seem that the entire group is of western origin and of old standing. It may have had an ancestral continental form which gave rise to the parental stock originating in Sundaland as a side-branch of the *V. smaragdina* and *gracilis* assemblages occurring in India and Indochina. This distribution can perhaps be explained by assuming that the *amoena*-branch followed the major invasion route from Burma and occupied the most suitable parts of Sundaland at a time when the sea-level was still low. If so, the least differentiated and at the same time most widely spread species, *V. amoena,* which has reached Borneo, is older than the rest, the majority of the group having evolved after the islands were severed from the continental block by the rising sea-level in post-pleistocene times. Zeuner (1943), in his highly instructive work on the systematics and phylogeny of the Australasian genus *Troides* Hübner (s.lat.), has mentioned a group of papilionid butterflies showing a somewhat similar, though less complicated, distribution-pattern. This is the purely Malaysian species-group of *T. amphrysus* (Cramer), which contains four polytypic species of which several are of sympatric occurrence, also in Java.

Whereas the three species of *Vestalis* s.str. are allopatric[2]), the males of each possessing deeply pigmented and brilliantly coloured wings, we have seen that both sexes of all known members of the *V. amoena* group have translucent wings, aged individuals even showing approximately the same amount of faint iridescence and apical obscuration. Although this cluster of intimately allied species are remarkably similar, the males have quite distinctive abdominal appendages by which they can be held apart. Several amongst them live side by side under seemingly identical ecological conditions. Since intermediate forms have never been found, there is every reason to assume that they are unable to interbreed, which is regarded as further proof of their specific distinctness.

All known locality records of the regional species characterized and named in the present paper are entered in the accompanying distribution maps (fig. 3—4), doubtful records and identifications being omitted therefrom. It is obvious from these maps that there occur several species whose ranges overlap, but there exist also some representing each other geographically. For instance, the same two

---

[1]) For an explanation of the term Malaysia as outlined by Boden Kloss, Chasen, Lieftinck, etc., see the writer's "Handlist" (1954).

[2]) Except in the extreme south of Sumatra, where *V. luctuosa* and *lugens* are not uncommonly found together (see Lieftinck, 1954).

species, *V. amoena* and *amethystina,* occur sympatrically in the western part of the distributional area comprising southern Thailand, the Malay Peninsula and Sumatra. Only one of them, *amoena,* extends further east into Borneo, where it meets another close ally, *amaryllis.* Although the range of the latter also includes the island of Bangka in the west, it has not apparently succeeded to reach Sumatra and the Malay Peninsula, i.e. the territory occupied by *amethystina.* This distribution suggests that, although both *amethystina* and *amaryllis* are undoubtedly of western origin, the Bornean *amaryllis* had already become isolated and differentiated before *amethystina* could establish itself as an independent species.

Eliminating quite a number of ambiguous cases, all instances where sympatric occurrences of two or more species could be definitely established, are listed in Table I.

Table I. Sympatric occurrences of the *Vestalis amoena* species-group in the western part of the Malay Archipelago

	amethystina	*amoena*	*amaryllis*	*amnicola*	*atropha*	*amabilis*	*beryllae*	*anacolosa*
Thailand:								
Trang waterfall, same month	+	+						
Malay Peninsula:								
Kuala Lumpur area (Selangor)	+	+						
Sumatra:								
NE Sumatra (Deli)	+	+						
Kedaton (Lampong)	+	+						
Mt. Tanggamus (id.), same date	+	+						
Bangka:								
Lubuk Besar, same date		+	+					
Borneo:								
Mt. Dulit (Sarawak)				+	+	+	+	
Mt. Penrissen (Sarawak)			+		+		+	
Kuching area (Sarawak)		+	+					
Labuan Island		+	+					
Singkawang (W Borneo)		+	+					
Ampah (SE Borneo), same date		+	+					
Long Hut (Kutai), same month			+				+	
Mt. Marapok (Sarawak)			+			+		
Mt. Kinabalu (Sabah)				+			+	+

Borneo is a significant distributional centre which produced no less than 4 other species, all of them peculiar to the island (fig. 4). It is there that the development of the genus culminates in the remarkably specialized *V. beryllae.* Structurally, this species holds an isolated position, recalling that of another Bornean calopterygid, viz. *Neurobasis cyaneipennis* Förster. This has been segregated from the polytypic species *N. chinensis* (L.) under the subgeneric name *Matronoides* Förster.

ETHOLOGY

JOHNSON (1961), referring also to several earlier writers on breeding behaviour in Calopterygidae, has shown that in *Hetaerina* different wing patterns are important functional requisites in species recognition for conspecific mating. In this and other genera it has, indeed, been experimentally verified that the females recognize and respond to males of their own species through a set of optical stimuli including the colour design of the wing.

With reference to the above, it would seem that the species recognition factors in this clear-winged group of *Vestalis* are mainly the shape of the male appendages and in a few instances (*V. beryllae*) also, perhaps, body colour. It is to be expected that in the sympatric species reproductive isolation is accomplished and maintained by a combination of these structural differentiations and ethologically opposed treats, such as posture, flight- and courtship-behaviour, etc.

KEY TO THE MALES

1. Abdomen with appendages at least 63 mm long, hind wing $^4/_7$ length of abdomen or less. Mouth-parts, antennae and thoracic segments lacking any yellow colouring, the sutures black. All abdominal segments brilliant metallic green; sup. app. black. Penis shaft with triangular process on either side near apex; glans wide, its distal portion short and shield-like carrying a pair of twice folded, elaborately twisted and frilled basal lobes (outer branches) and ending in a pair of simple lanceolate flaps (inner branches) (fig. 10). Anal app. broader and more flattened than in the allied species (fig. 10). Hab. Borneo . . . . *beryllae*

— Abdomen with appendages not exceeding 51 mm, hind wing about $^3/_4$ length of abdomen. Only basal segments of abdomen metallic green, turning to bronze-black or black posteriorly. Penis shaft with low transverse ridge on either side near apex; glans narrower, its distal portion much longer than wide in ventral view, ending in a pair of long biramous filamentous lateral processes, the basal ones (outer branches) carrying a short spine, the apical (inner branches) simple (fig. 2) 2

2. Inf. app. rudimentary: lateral processes reduced to blunt subtriangular tubercles (fig. 7, 9). Labium black, only palpiger and 1st palpal segment yellow exteriorly; mandible-bases with isolated squarish spot. Labrum dark metallic black. Basal half to $^2/_3$ of 2nd antennal segment yellow anteriorly. Female unknown. Hab. N Borneo . . . . *anacolosa*

— Inf. app. at least half as long as superiors, broad at base, ending in long slender lateral processes 3

3. Distal portion of inf. app. relatively short and thick, straight and cylindrical, not reaching back quite as far as the subapical projection of sup. app. (fig. 5, 9). Sup. app. with a single obtuse-angulate interior tubercle before apex, the upper surface of which is slightly wrinkled but neither scalloped nor deeply emarginate and devoid of tooth-like inner projections. Labium predominantly yellow tipped with black; mentum partly and median lobe on either side of the

middle frequently obscured but never black; stipes of maxilla usually pale. Mandible-bases yellow. Labrum at least partly yellow, very rarely entirely metallic black. Yellow mark on anterior face of 2nd antennal segment almost or quite reaching apex of same, though frequently reduced to a basal spot; very rarely absent altogether. Thoracic sides and ventral surface at least partly with yellow colouring on infraepisterna, lower parts of metapleura and poststernum, these yellow areas occasionally obscured or concealed from view by grey-blue pruinescence. Hab. Malaya to Borneo . . . . *amoena*

— Distal portion of inf. app. distinctly longer with more slenderly incurved apices, though occasionally degenerated and filiform. Labium predominantly black, only palpiger and 1st segment of palpus narrowly bordered with yellow outwardly; stipes of maxilla usually obscured. Lower parts of thoracic sides largely obscured and poststernum wholly black 4

4. Sup. app. with a single obtuse-angulate interior tubercle before apex, which is more expanded and hollowed out ventrally, than in *amoena*; upper surface of apex with inner edge not prolonged cephalad, neither ridge-like nor emarginate within (fig 5, 9). Inf. app. very slender, reaching back as far as subapical projection of sup. app. or even a little further. Mandible-bases with isolated yellow spot. Labrum metallic black, unmarked with yellow. Anterior face of 2nd antennal segment entirely black or with small basal yellow spot. Thoracic sides and ventral surface lacking yellow spots, the yellow stripes bordering second suture and latero-ventral margin of metepimerum linear or obliterated. Hab. Borneo . . . . *amabilis*

— Apex of sup. app. more cylindrical in outline (not bluntly triangular with inwardly bent tip), distinctly hollowed out within when viewed from above, the outer portion being on a higher level than the inner; inner margin in dorsal view continued cephalad as a gradually more swollen ridge that curves at first outwards and then inwards so as to enclose a tiny hollow, the ridge itself ending abruptly in a blunt tooth or knob; in ventral view the subapical tubercle is either single or differentiated to form tooth-like projections. Inf. app. very slender, of variable length and strength 5

5. Inf. app. of the usual breadth basally but soon narrowed to form extremely thin, shrivelled, thread-like processes reaching back scarcely as far as the interior subapical tubercle of sup. app., which is strongly protuberant; distal portion of sup. app. drawn out, gently upcurved (fig. 8). Labrum metallic black, lacking yellow spots. Mandible-bases with isolated basal yellow spot. Anterior face of 2nd antennal segment black or with vestigial basal yellow spot. Lower parts of thoracic sides black; yellow stripe bordering second suture and latero-ventral margin of metepimerum linear and/or obliterated. Small, narrow-winged species with a maximum of 53 postnodal cross-veins in fore wing, 43 in hind wing. Female unknown. Hab. Borneo . . . . *atropha*

— Inf. app. long, less emaciated, reaching back as far as interior projection of sup. app., the latter shorter, more evenly incurved. Postnodal cross-veins 53—81 in fore wing, 44—60 in hind wing 6

6. Apical portion of sup. app. rather broad, the interior projection prominent though simple and broadly rounded, the surface beyond it smoothly concave

ventrally and bounded apically by a low transverse ridge; no pronounced ridges or projections, the apex itself more or less oval (fig. 7, 9). Labrum metallic black, occasionally with vestigial yellow spot on each side. Anterior face of 2nd antennal segment with basal yellow spot attaining $^1/_3$ or less of whole length. Narrow yellow stripes, incomplete on both ends, bordering second suture and latero-ventral margin of metepimerum. Apices of wings more drawn out and tips more pointed than in allied species. Hab. Borneo . . . . . *amnicola*

— Apical portion of sup. app. narrower, of complex structure interiorly. Labrum invariably marked with yellow 7

7. Ventral tubercles preceding apex of sup. app. relatively small, ridge-like tip of appendage projecting far beyond apex of inf. app. (fig. 6, 9). Anterior face of 2nd antennal segment entirely yellow or almost so. Lower parts of thoracic sides usually with some yellow colouring on infraepisterna, metapleurae and coxal bases; yellow stripes bordering second suture and latero-ventral margin of metepimerum distinct, though occasionally incomplete. Hab. Malaya and Sumatra . . . . *amethystina*

— Ventral tubercles preceding apex of sup. app. well-developed, especially the distal one in the form of a prominent tooth; inf. app. relatively longer (fig. 6, 9a). Anterior face of 2nd antennal segment either entirely yellow or only the basal half to one-third coloured thus. Lower parts of thoracic sides with traces of yellow only, or entirely black; stripes bordering second suture and latero-ventral margin of metepimerum likewise variable, often linear, obliterated, or even obscured so much as to become scarcely discernible. Hab. Bangka and Borneo . . . . *amaryllis*

Vestalis spec. indet.

Material. — Burma: 1 ♂ (ad.), Tenasserim, Mergui (Mergwe) Archip., King Island, 23.VI.1927, J. ELTON BOTT, ex coll. F. C. FRASER (BM).

Light chrome yellow are the following parts: the entire labium including the median lobe, only the tips of the palpi being black; visible parts of the maxillae; basal two-fifths of mandibles including the trochantins; labrum with the exception of a diffuse mid-basal spot and a stripe along anterior border, widest in the middle; a mid-basal spot on anteclypeus; whole anterior surface of 2nd antennal segment. Anteclypeus, genae and a narrow stripe, tapering upwards, along margin of compound eye, black. Rest of the head brilliant emerald green; rear pruinescent grey-blue. Lower margin of propleuron narrowly yellow. Median carina, humeral and first lateral sutures finely black. Most of the infraepisterna, lower parts of mesepimera and metapleurae below level of spiracle, as well as the entire ventral surface of synthorax, coxae and trochanters, yellow; elongate metallic green patch covering most of the metepimerum abbreviated ventrad, the yellow stripe along second suture twofold. Lower areas of thorax pruinescent.

Wing membrane hyaline; nodal index $\frac{50.25.26.52}{45.21.22.45}$; q $\frac{3.4}{3.3}$; *cux* $\frac{9.11}{9.\ 9}$; one cell-row Cu_1—Cu_2.

Anal appendages shaped much as in *V. amoena* but the superiors less incurved and more drawn out; inferior appendages longer and slenderer.

Measurements: abd. + app. 47.3 mm, hind wing 36.0 : 8.4 mm.

I believe this specimen to represent a distinct new species. It is unfortunately the only individual of the group from outside the Malaysian Subregion examined by me. To name it at this time might result in confusion for subsequent authors as it is not in too good a condition, its terminal appendages, moreover, being distorted and unfit for figuring.

Vestalis amoena Selys, 1853
(fig. 1, 2, 3, 5, 9)

Material. — Lectotype ♂ (incomplete), hab. ign., labelled: "? Java", see below (MCZ). — Thailand: 5 ♂ (one with abdomen missing), with printed labels: S. Siam, Trang waterfall, 9, 21 and 23.VII.1935 and 7.VIII.1935, Dajak LAYANG GADDI coll., R. Mus. Hist. Nat. Belg. I.G. 10.688 (IRSN). — Malay Peninsula: 1 ♂ 1 ♀, "Malacca" (yellow, DE SELYS' writing); 1 ♀, "Mt. Ophir" (white disk), "Malacca" (yellow, DE SELYS' writing) (IRSN); 1 ♂ (juv., wings defective), "Malacca" (DE SELYS' writing) (IRSN); 1 ♂ (juv., wings defective), "Malacca" (DE SELYS' writing, orange label), "*V. amoena* Malacca", ex coll. & det. MACLACHLAN, and "Paratype" (BM); 1 ♂, Perak, 4 miles N of Kp. Lasah, Sungai Chior (Chior Big Game Forest Reserve), 9.IV.1964, J. I. FURTADO (ML); 1 ♂, Selangor, Sungai Rumput (tributary of S. Gombak), 5.I.1964, J. I. FURTADO (ML); 1 ♂, Selangor, Sungai Gombak, 16th mile Kuala Lumpur-Bentong road, 13.IV.1964, J. I. FURTADO (ML); 2 ♂, Selangor, Kuala Lumpur, brook in rubber garden, 2.III.1962, G. F. MEES (ML); 1 ♂, Negri Sembilan, Malay Peninsula, H. N. RIDLEY (BM). — 2 ♂, Pulu Tioman, Sedagong, V.1927, ex coll. F. C. FRASER (BM). — Sumatra: 7 ♂, Ost Sumatra, A. HEYNE vend. 1919, *V. amoena* det. F. RIS (SMF); 1 ♂, NE Sumatra, Serdang, Tandjong Morawa, B. HAGEN (ML); 1 ♀, Inderagiri, Pangkalan Kasai-Sebrida road, 15.IV.1939, P. BUWALDA (ML); 2 ♂, "Sumatra Weijers", "M. Weijers Westkust Sumatra" and "*V. amoena*" (all in DE SELYS' writing) (IRSN); 6 ♂ 3 ♀, Palembang, Mt. Dempo, 700 m, Pagar Alam, 23.V.1935, M. E. WALSH (ML); 4 ♂ 1 ♀ (1 ♂ app. drawn, fig. 5, 9; ♀ wing-bases, fig. 1), Lampong Distr., foot of Mt. Tanggamus, Giesting, 400 m, 24 & 27.XII.1934 and Wai Berah, 28.XII.1934, M. A. LIEFTINCK (ML); 1 ♂, same loc., 17.VI.1934, L. J. TOXOPEUS (ML); 2 ♂, E. Lampong distr., Menggala, Terbanggi-ilir, 14 & 19.-VIII.1936, M. BARTELS; 2 ♀, Lampong distr., Kedaton Estate, 150 m, 23.III.1937, J. V. D. VECHT; 1 ♂, same area, Kasui, 23.VIII.1933, H. R. A. MULLER (ML). — Bangka I.: 3 ♂, Lubuk Besar, 20 m, IX-X.1949, A. J. KOSTERMANS (ML); 1 ♀ (juv.), Petaling, 18.II.1932, J. V. D. VECHT (ML). — Billiton I.: 1 ♂, Central Billiton, Begantung, 23.VIII.1935, F. J. KUIPER (ML); 1 ♀ (juv.), W. Billiton, Tjerutjuk, 22.II.1937, F. J. KUIPER (ML). — Borneo: 1 ♂ (penis drawn, fig. 2), Brit. N Borneo (Sabah), SW part of Sandakan Bay, Sapagaya Lumbering Camp, 6.XI.1957, J. L. GRESSITT (ex BISH, ML); 10 ♂ 4 ♀ (sub *amoena*), labelled "Labuan Borneo", or "Labuan" (yellow, DE SELYS' writing) (IRSN); 1 ♂, Labuan Borneo, *Vestalis anoena* Hagen, Borneo, ex coll. & det. H. ALBARDA (ML); 1 ♂, labelled "Labuan" (yellow, DE SELYS' writing), "*Vesta-*

lis amoena Hag. ♂ Labuan" (id.), "Hagen" (white, printed) (MCZ). 1 ♂ (juv., app. missing) 1 ♀, W Sarawak, SE of Kuching, near Serian, Tapuh, 6-9.VII. 1958, T. C. MAA (ML); 2 ♂, extreme W Sarawak, kampong Poëh, 1—2.VI & 6—13.VI.1958, T. C. MAA (BISH, ML); 3 ♂ (one with last abd.-segm. missing), W Sarawak, Merirai valley at Rajang river, nr. Kapit, 600 ft., secondary forest, 28.VII—6.VIII.1958, T. C. MAA (BISH, ML); 2 ♂, same area, Nanga Pelagus, 600—1750 ft., 7—14.VIII.1958, T. C. MAA (BISH, ML); 1 ♀, Sarawak, Kuching, 27.VI.96, ROLLE vend., *V. amoena* det. F. RIS (SMF); 2 ♀, Central E. Borneo, Kutai, Bloe-oe, 26.IX.1894, Borneo Exped., Dr. NIEUWENHUIS (ML). 15 ♂ 4 ♀, Southeast Borneo, Kandangan, Ampah, 0—20 m, IV—V.1948, LIEM SWIE LIONG (ML, MCZ); 2 ♂, South Borneo, Sampit area, Sungai Sampit, 12.I. 1950, W. BUYN (ML); 1 ♂ (def.), West Borneo (BM); 1 ♂ 2 ♀ (1 ♀ juv.), West Borneo, Sintang, "Wald", 2.III, 4—16.IV.1910, Dr. L. MARTIN (SMF); 9 ♂ 6 ♀, West Borneo, environs of Singkawang: Piong San road, 9.XII.1931 (♂), Bengkajang road, 16.XI.1931, 30.XII and 11.X.1932 (3 ♀), Bakuan, Selakau river, 22.I.1934 (1 ♀), forest marsh near Bakuan, 7.XII.1931 & 15.IX. 1932 (1 ♂ 1 ♀), Penaring boundary, forest stream, 21.XII.1931, 28.I—8.II.1932 (7 ♂ 1 ♀), all L. COOMANS DE RUITER (ML). — 3 ♂ 3 ♀, Karimata I., off SW Borneo, Sungai Palembang, 26.III.1931, L. COOMANS DE RUITER (ML).

V. amoena was first described by DE SELYS LONGCHAMPS in the Synopsis (1853: 25—26) after a male and female from "Sumatra", ex coll. SCHNEIDER and WESTERMANN, respectively. In the Monographie (1854: 82—83), which appeared under the joint authorship of DE SELYS and HAGEN, a more detailed description of these two individuals is given and their origin specified. The male from "Java", acquired by SCHNEIDER from DE CHARPENTIER, was submitted to HAGEN who himself prepared the description and gave it to DE SELYS for incorporation in the Monographie. The female from "Pulo Penang" in WESTERMANN's collection most likely belongs to *amethystina* but will not concern us here. In the 3rd Additions to the Synopsis (1873: 475), DE SELYS declares that: "c'est de Malacca et de l'Ile du prince de Galles [Penang] que j'ai reçu les types décrits précédemment". The proper habitat of the type specimen thus being not definitely known we have to take our choice between the islands of Sumatra or Java, and the Malay Peninsula.

The type (lectotype by present designation) is a male in dilapidated condition. The head (detached and found loose in the drawer) has been glued on to the prothorax; the abdomen is broken in two places and subsequently mended (segments 6 and 8—9), the segments 7 and 10 + terminalia are missing. The total length of the rest of the abdomen is 37.3 mm, of the hind wing 34.5 mm. The specimen bears the following labels: "Java" (written on old white label, perhaps in T. DE CHARPENTIER's writing); "Charp." (written on old white cadre, perhaps in SCHNEIDER's hand); "V. amoena *Hag." (HAGEN's writing on old white black-framed cadre), with "not type, Banks" written in the corner; "Hagen" (small print); "Type MCZ no. 30.907".

As indicated above, the lectotype may or may not have come from Java. The locality given is probably erroneous, or at least unreliable, as the species has never turned up again in that island (LIEFTINCK, 1934). In my "Handlist"

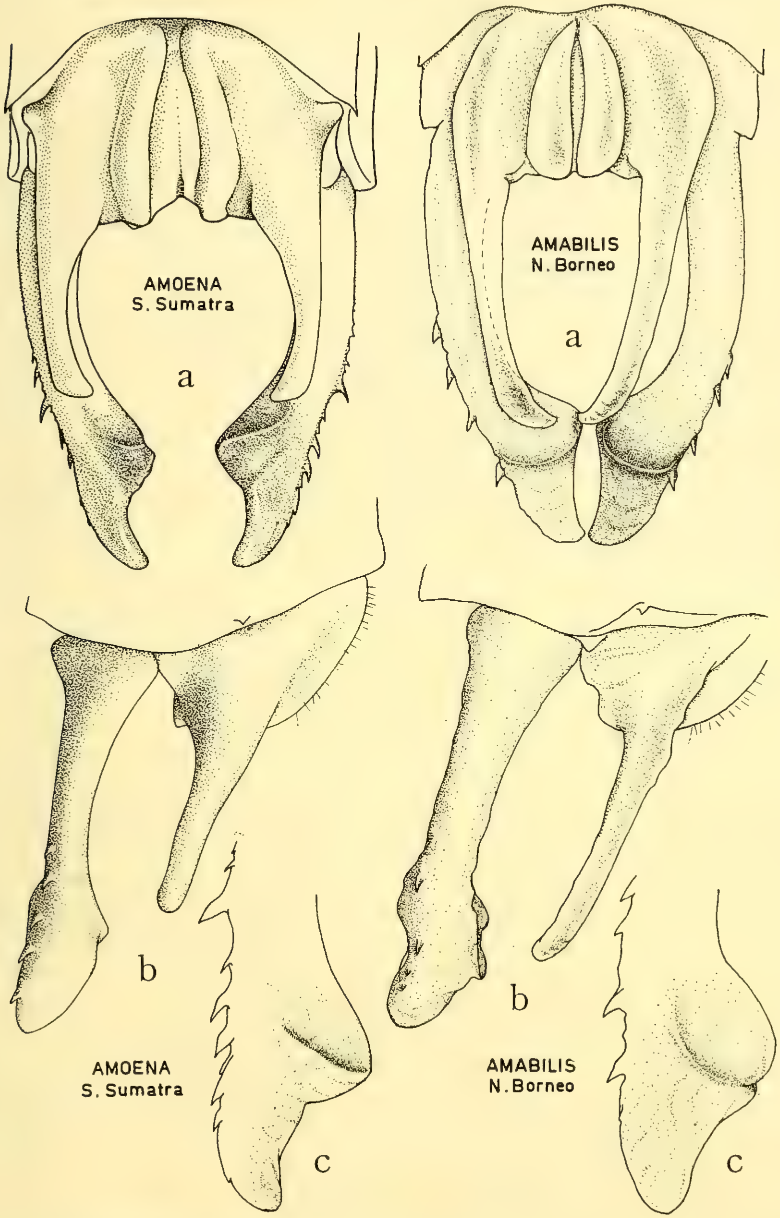


Fig. 5. Anal appendages of *Vestalis* species. a, ventral, b, right lateral view; c, apex of left superior appendage more enlarged, dorsal view

(1954) I suggested that it still awaits re-discovery in Java or may have occurred there and become extinct, the last possibility being the most likely one. The two other specimens in the same collection are from Labuan, but these are of much later date than the type and therefore of less importance. The young male from

"Malacca" in the British Museum collection (ex coll. MACLACHLAN), labelled "paratype", also originates from DE SELYS' collection and may stay as a paratype of *V. amoena.*

Despite a slight discrepancy in the first description of the superior anal appendages of the male, which are said to be "presque bifides à leur extrémité", I believe to have correctly associated our specimens with the type, now lacking its terminalia. This has the stipites of the maxillae as well as the entire basal half of the labium yellow, only the disk beyond the yellow mentum being obscured; this is a distinctive feature of all individuals here assigned to *amoena* serving to separate it from its allies. The sides of the thorax have much yellow on the lower parts, most of the ventral surface also being yellow. The stripes along the second suture and latero-ventral margin of metepimerum are moderately broad, the former being narrowly interrupted by black on both ends. In the majority of our specimens, regardless of locality, these yellow stripes are even wider, the first one often being twofold, i.e. joined to a somewhat shorter metepisternal hair-line. The wings of the type are quite clear, there being no marginal obscuration at the apices so frequently observed in old adults. The principal characters of the venation are summarized in Table II. Those of the type are:

$$\text{cross-veins in } q\ \frac{3.4}{3.3};\quad \text{nodal index } \frac{62.25.27.65}{—.21.24.—}.$$

Further material. Male. — The extent of black marks on the labrum varies considerably throughout our series, though in the majority the yellow basal stripe is narrowly interrupted in the median line so as to form a T-shaped black mark. A few old males from Ampah (SE Borneo) show no trace of yellow but these are rare exceptions. In them all light body marks tend to become obliterated: only the basal two-thirds of the 2nd antennal segment remains yellow anteriorly, the thoracic stripes are linear and the under surface of the thorax becomes blackish. Should the appendages not be in good condition, such individuals can be recognized only by the palpus being more broadly spotted than in any other species.

The two males from Tioman Island average larger in size than those from other regions and have a correspondingly higher nodal index. In the hind wings of one there are irregularly two rows of cells between Cu_1—Cu_2. They agree with other Malayan specimens; in one the labrum carries a pair of transverse yellow spots, in the other it is unicoloured greenish black. On the other hand, the few specimens from Bangka and Billiton, are relatively of small size, agreeing in this respect with those from Ampah in SE Borneo. Some evidence to the contrary can be observed in a population occupying the Karimata group of small islands, off SW Borneo, where the insects are superior in size to those occurring on the opposite mainland.

With age the wing membrane in both sexes becomes dusky around the margins and at the tips, in some old individuals the whole wing acquiring a greyish-brown tint.

The superior anal appendages are not unlike those of the Indian species *Vestalis gracilis* Ramb. and its immediate allies, a group of forms also agreeing with *V. amoena* in having the inferior pair relatively short and thick. In the Malaysian

V. amoena the oblique transverse carina of the superior appendage is always well-developed on the dorsal as well as on the ventral surface, ending at a point where the subapical expansion is widest, or extending roundabout the latter. These ridges are, however, not precisely similar in all populations examined: in Malayan and Sumatran specimens the dorsal carina is placed a little more transversely than in those from Borneo, though in all of them the appendage on both sides of the dorsal ridge is hollowed out (fig. 5, 9). The short and robust form of the inferior appendage is quite constant and serves to distinguish the species from the much scarcer *V. amabilis.*

Female. — The labium is invariably yellow, only the tips of the palpi and (more rarely) also of the midlobe being black. The labrum usually carries a black point in the middle at base besides having the anterior border black; only in about 14% of the total the light colour is more restricted, the labrum then bearing a T-shaped black mark. There is often a median spot of yellow on the anteclypeus. The lower surface of the thorax remains yellow even in aged individuals though bluish pruinescence may conceal or obscurate the light colours.

Size very variable. Male (see Table III). The dimensions of Bornean females are: abd.+app. 35.0—39.0 mm, hind wing 31.0—36.0 mm. It is worth mentioning that considerable individual variation exists in the proportionate lengths of abdomen and hind wing, the difference in length in our series from Borneo varying from 2.5 to 6.0 mm, with an average of 3.4 mm.

Vestalis amethystina spec. nov.
(fig. 3, 6, 9)

Material. — Thailand: 3 ♂ 1 ♀ (ad., indet.), S. Siam, Trang waterfall, 20.VII.1935, Dajak LAYANG GADDI coll., R. Mus. Hist. Nat. Belg. I. G. 10.688 (IRSN). — Malay Peninsula: 1 ♂ (sub *amoena*), Malacca (yellow label, DE SELYS' hand), 27, *Vestalis amoena* 1 exempl. M. TILLYARD (unknown writing) (IRSN); 1 ♂, Kedah, Kedah Peak, 22.VIII.1937 (BM); 2 ♂ 7 ♀, Wellesley, Penang I., Batu Feringgi, Catchment Area, 2—500 ft., 23.II, 31.V, 2.VI, 1.VII, 31.VII.1960, and 2 ♀, Sungai Pinang, 1500 ft., 12.III & 24.VII.1960, H. T. PAGDEN (ML); 2 ♂, Perak, Ding Ding Is. & Dindings, H. N. RIDLEY (BM); 1 ♂, Perak, Batang Padang, Jor Camp, 1800 ft., 4.VI.1923, H. M. PENDLEBURY, ex coll. F. F. LAIDLAW (coll. J. COWLEY); 1 ♂, Perak, Jor, 4.VI.1923, *V. amoena*, det. F. F. LAIDLAW (coll. J. COWLEY); 1 ♂, Perak, Taiping Pass, 1000 ft., 9.VI.1937 (BM); 1 ♂, Perak, 14th mile, Cameron Highland's road, 11.000(?) ft., 12.IX.1937 (BM); 1 ♂ (juv.), Perak, Ipoh, Kramat Pulai, 23.IV.1961, H. T. PAGDEN (ML); 1 ♂, Selangor, Kuala Lumpur, Ampang reservoir, 13.V.1960, H. T. PAGDEN (ML); 1 ♂, Selangor, same locality, "caught at small feeder stream falling into lake", 16.I.1964, J. I. FURTADO (ML); Singapore I.; 1 ♂, Singapore (BM). — Sumatra: 1 ♂, Atjeh, Kutatjane, 21.III.1954, A. H. G. ALSTON (BM); 1 ♀, NE Sumatra, Asahan river, Tangga, 300 m, 2.VIII.1928, J. C. VAN DER MEER MOHR; 1 ♂, Ost Sumatra, no. 5451, A. HEYNE 1919, *V. amoena*, det. F. RIS (SMF); 1 ♂ 1 ♀, Padang Highlands, Kloof van Harau, I.1937, E. JACOBSON (ML); 2 ♂, Benkulen, Lebong Tandai, VII.1922 & IV.1923,

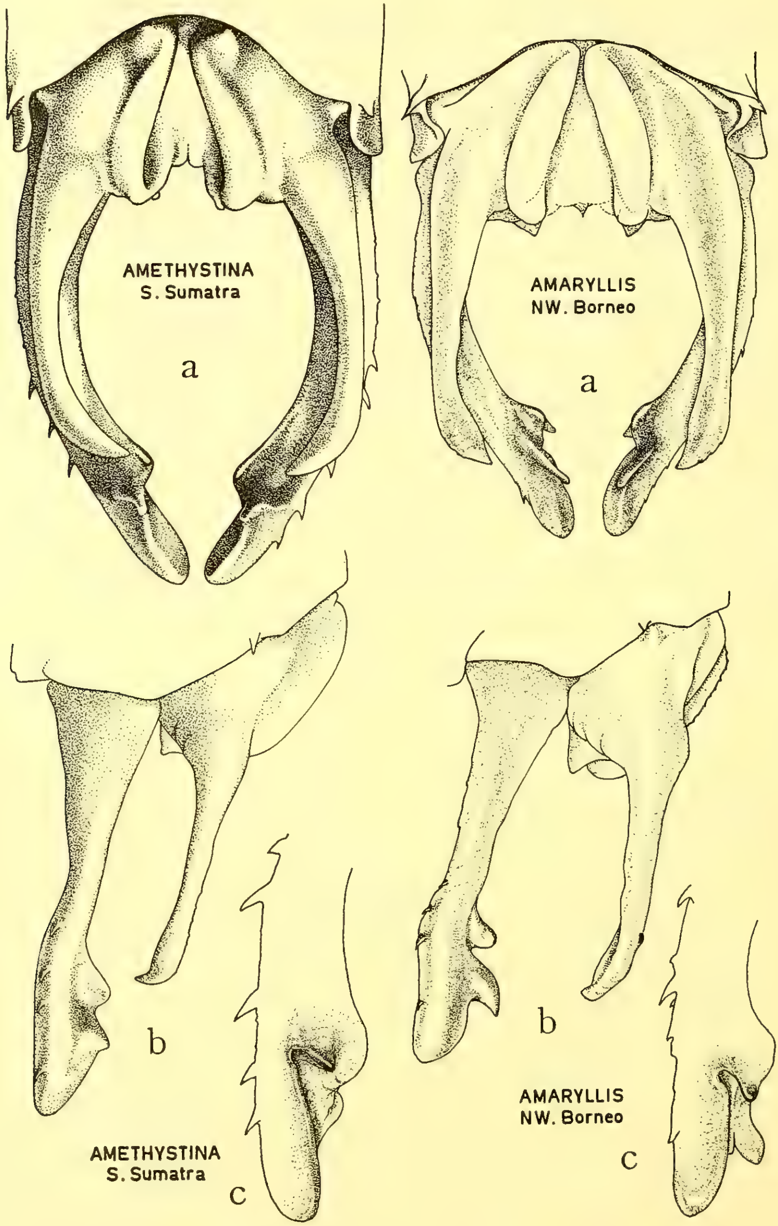


Fig. 6. Anal appendages of *Vestalis* species, a, ventral, b, right lateral view; c, apex of left superior appendage more enlarged, dorsal view slightly from within

C. J. BROOKS (BM); 2 ♂ 1 ♀, Benkulen, Muara Tenam, 250 m, 16—23.VI. 1935, M. E. WALSH (ML); 1 ♂ 1 ♀, Benkulen, Ranau Lake distr., Banding Agung, 27.X.1928, C. VAN STEENIS (ML); 1 ♂ 1 ♀ (holotype ♂ and allotype ♀; ♂ app. drawn, fig. 6, 9), Lampong distr., S. slope of Mt. Tanggamus, Giesting, 400 m, 24.XII.1934, M. A. LIEFTINCK (ML); 1 ♂, Lampong, Kedaton Estate, 14.IX.1932, H. R. A. MULLER (ML).

Female. — Of the same size and wing colour as *amoena* but even immature specimens can be distinguished therefrom by having a black labium, only a marginal hair-line of the palpi remaining yellow. Antenna with 2nd segment yellow anteriorly. The ventral surface of the thorax is likewise obscured, almost black in old adults, young females showing already a tendency towards obscuration of the lower surface. Some measurements are:

Penang I.: abd. + app. 35.0—40.0 mm, hind wing 32.0—35.0 mm
Sumatra: ——— 37.0—40.0 mm, ——— 33.0—36.0 mm.

This species is at present known only from southern Thailand, the Malay Peninsula and Sumatra, being replaced by *V. amaryllis* sp.n. in Borneo. As indicated in Table I, *V. amethystina* was repeatedly met with in company of *V. amoena.* Of the series taken by the Dajak collector at the waterfall near Trang (Peninsular Siam), 5 are *amoena* and 4 *amethystina.* The former were collected on 19, 21, and 23 July and 7 August, whilst the latter are all dated 20 July, 1935. Though not necessarily taken in exactly the same spot, these insects evidently occurred in close vicinity of each other. Anticipating that specific characters other than those already established should be detectable, these Trang specimens were thoroughly compared. However, the only additional feature by wich the males can be held apart is found in the ground-colour of the body, which in *amethystina* is of a less vividly yellow tint than in *amoena*; also, in the former the thorax underneath is usually darker than in the latter. In the typical locality (i.e., Lampong district of South Sumatra), I collected both species the same day myself, but since at the time they were not recognized and held apart in the field, any specific ethological differences, if at all perceptible, were not noticed.

Vestalis amaryllis spec. nov.

(fig. 2, 4, 6, 9a)

Material. — B a n g k a I.: 1 ♂, Mangkol, 20—100 m, 16.X.1949, and 2 ♂, Lubuk Besar, 20 m, IX—X.1949, A. J. KOSTERMANS (ML). — B o r n e o: 3 ♂, N Borneo, Tawau, Quoin Hill, Forest camp I, 2—3 mi. WSW of cocoanut Res. Sta., 3—20.VII.1962, Y. HIRASHIMA (BISH, ML); 1 ♂, N Borneo (Sabah), Bettotan, 10.V.1927, " 22 mi. W by S of Sandakan up a river running into the head of Sandakan Bay; secondary growth low country" (penis dissected, coll. J. COWLEY); 1 ♂ 2 ♀, Bettotan, 24.VII (♂) and 25.VII (♀) 1927, *V. amoena*, det. F. F. LAIDLAW & J. E. H. ROBERTS (coll. J. COWLEY); 1 ♂, N Borneo (Sabah), Elopura (= Sandakan Bay), III.1884, *V. amoena* ex coll. & det. R. MACLACHLAN (BM); 1 ♂, SW N Borneo (Sabah-Sarawak boundary), Brunei Bay

Table II. Venational characters

	Antenodals		Postnodals		Nervures in quadrangle		Nervures in cubital space		Greatest width of hind wing		Average ratio distance base-nodus to nodus-apex	
	fore	hind	fore	hind	fore	hind	fore	hind	range	average	fore	hind
amoena	23—28	18—23	50—73	45—59	2—4	2—4	8—11	7—11	7.6— 9.0	8.5	10 : 17.32	10 : 17.02
amethystina	24—31	18—25	59—72	46—58	3—5	3—5	9—12	8—11	8.5— 9.6	8.9	10 : 16.42	10 : 16.86
amaryllis	25—31	18—23	53—65	44—56	3—5	3—5	8—11	8— 9	7.8— 9.2	8.2	10 : 16.75	10 : 17.05
amnicola	24—34	18—29	56—81	44—60	3—6	2—5	8—12	7—10	8.4—10.0	9.2	10 : 15.67	10 : 16.02
amabilis	25—29	20—24	58—72	44—58	3—6	4—5	9—11	9—11	8.1— 8.4	8.27	10 : 16.15	10 : 15.87
atropha	23—27	17—21	46—58	38—45	2—4	2—4	6—10	6— 9	7.6— 7.8	7.7	10 : 14.97	10 : 15.41
anacolosa	26—28	21—22	60—63	53—54	4	3—4	10—11	8	8.8	8.8	10 : 15.50	10 : 16.30
beryllae	31—33	27—29	76—92	60—71	4—6	4—6	10—12	10—13	8.2— 9.2	8.7	10 : 19.20	10 : 18.50

area, Dent Province, Mt. Marapok, collector G.[1]) (ML); 5 ♂ 1 ♀ (sub *amoena*), labelled "Labuan Borneo" or "Labuan" (yellow, DE SELYS' writing) (IRSN); 1 ♂, Labuan, Borneo, *V. amoena* Hag. ♂, ex coll. & det. H. ALBARDA (MA); 1 ♀ (def.), "Labuan/Borneo", "*Vestalis amoena* Hag. ♀ Labuan" (yellow labels, DE SELYS' writing) and "Hagen" (printed) (MCZ); 1 ♂ 1 ♀, Labuan, Borneo, ex coll. SELYS, *V. amoena* det. F. RIS (SMF); 3 ♂ 3 ♀, Sarawak, Kuching, 9—31.I, 10.II and 7.VIII.1896, ROLLE vend., *V. amoena*, det. F. RIS (SMF); 2 ♂ 1 ♀, SW Sarawak, NE slope of Mt. Penrissen, low country, Tebang, 6.IX.1958, T. C. MAA (ML, BISH); 5 ♂ 1 ♀ (including holotype ♂ and allotype ♀; app. drawn, fig. 6, 9a), W Sarawak, slope of Mt. Santubong, 30.IX.1950, M. A. LIEFTINCK (ML); 3 ♂ 3 ♀, East Borneo, Sangkulirang distr., Kariorang and Batu Besi, low country, 12.III.1937, J. W. QUARLES DE QUARLES and V—VI.1937, M. E. WALSH (ML); long series (both sexes, one ♂ penis drawn, fig. 2), Central East Borneo, Kutai, Samarinda area, Belajan valley, kali Bengen, Tabang, 125 m, VIII—IX.1956, A. M. R. WEGNER et al. (ML, MCZ); 1 ♂ 1 ♀, Central E. Borneo, Kutai, upper reaches of Mahakam river, Sungai Telen valley, Long Hut, 130 m, no. 37, 17.VIII.1925, and Long Petak, 440 m, no. 70, no date, H. C. SIEBERS, M.O. Borneo Exped. (ML); 4 ♂, Southeast Borneo, Kandangan, Ampah, 0—20 m, IV—V.1948, LIEM SWIE LIONG (ML), 1 ♂ 1 ♀, "Z. & O. Afd. Borneo, Kap. Benschop" (old round label) (ML); 1 ♀, West Borneo, Singkawang area, Piong San road, 9.XII.1931, L. COOMANS DE RUITER (ML). — B a n g u e y I. (Banggi), Balabac Strait: 1 ♂, Bangey, Ins. nördl. Borneo, W. KEDENBURG, ded. 20.VII.1894, *V. amoena* Hag., det. M. A. LIEFTINCK 1928 (ML, from series in ZMH). — B a l a b a c I.: 1 ♂ (semiad.), Balabac, no. 31280, A. EVERETT (SMF).

Female. — Similar to *amethystina* though light markings less extensive and more frequently obscured. Antenna with second segment yellow anteriorly. Colour of labium, lower parts of thoracic pleurae and ventral surface apparently variable. In common with *V. amoena* and *amethystina*, the wings become rather strongly tinted a greyish or yellowish brown in aged individuals.

As in *V. amoena*, there is much individual variation in the relative lengths of abdomen and hind wing, the difference fluctuating between 2.5—5 mm (Table III).

The specific identity of some females must remain uncertain. The dimensions of those collected in association with males are:

---

[1]) Mr. TOM HARRISSON, Curator of the Sarawak Museum (Kuching), kindly informs me in a letter that Mt. Marapok (near Merapok) "is a set of lower hills, up to 3000 ft. high, running behind the Mengalong and Lawas rivers across the Sabah-Sarawak border as outliers on the seaward side of the larger Crocker range. Sandstone with some limestone pockets". This information is corroborated by the botanist Dr. W. MEYER, of Sandakan (Sabah), who wrote me that Mt. Marapok (rect. G. Masatoh?) is a hill north of the Lawas and its tributary Sungai Mesatoh, situated just south of the south-west border of Sabah. According to Mr. HARRISSON, the collector "G" might well have been F. H. H. G. GUILLEMARD, the locality being only one day from Brunei Bay, where GUILLEMARD went in the cruise of the "Marchesa" early in April, 1883. However, there is nothing in vol. II of "The Cruise of the "Marchesa" (1886) to justify this supposition.

Labuan I. : abd. + app. 36.5—37.2 mm, hind wing 31.5—34.0 mm
Borneo ——— 33.5—41.5 mm, ——— 29.5—36.5 mm.

Has been found associated with *V. amoena* on Bangka Island and keeping company with that species in no less than four widely different localities in Borneo (Table I). Males are easily distinguished by the key characters although one example from Labuan I. is exceptional on account of its partly yellow labium and the great amount of yellow on the thoracic sides and underneath. In regard of markings it is, in fact, indistinguishable from *amoena* originating from the same small island. Some individuals have several duplicated cells in the proximal part of the space Cu_1—Cu_2 of the hind wings. More venational characteristics are given in Table II.

Of all members of the group this new *Vestalis* seems to find its nearest relative in *V. amethystina* sp.n., which it resembles most closely in the shape of the superior appendages.

Table III. Measurements

	Locality	Total number measured	Length of abdomen		Length of hind wing	
			Range	Average	Range	Average
amoena	Type	1	—	—	34.5	34.5
	P. Tioman	2	46.0—48.0	47.0	35.0—37.2	36.1
	Malaya	6	42.2—45.0	43.8	32.8—34.7	33.7
	Sumatra	25	44.2—46.7	45.3	33.7—36.5	34.9
	Bangka	3	39.0—43.5	40.8	29.0—32.3	30.1
	Billiton	1	43.7	43.7	31.3	31.3
	Borneo	34	39.0—49.0	43.6	30.5—36.4	33.0
	Whole range	72	39.0—49.0	44.5	29.0—37.2	33.4
amethystina	Malaya	10	42.0—46.9	43.8	31.5—36.0	33.2
	Sumatra	10	42.7—48.0	45.8	32.0—37.0	35.0
	Whole range	20	42.0—48.0	44.8	31.5—37.0	34.1
amaryllis	Bangka	3	41.2—43.4	42.3	30.8—32.2	31.5
	Borneo	56	40.4—48.0	44.2	30.5—36.0	33.2
	Banguey	1	43.8	43.8	33.8	33.8
	Balabac	1	42.5	42.5	32.4	32.4
	Whole range	61	40.4—48.0	43.2	30.5—36.0	32.7
amnicola	Borneo	12	41.4—51.0	47.2	31.0—39.0	35.7
amabilis	Borneo	4	44.0—46.0	45.0	32.0—34.2	32.9
atropha	Borneo	3	40.0—43.0	41.6	30.0—31.0	30.5
anacolosa	Borneo	1	48.0	48.0	36.0	36.0
beryllae	Borneo	7	63.0—73.5	66.4	35.0—41.5	38.0

Vestalis amabilis spec. nov.
(fig. 4, 5, 9)

Material. — Borneo: 3 ♂ 3 ♀ (ad., including holotype ♂ and allotype ♀), SW N Borneo (Sabah-Sarawak boundary), Brunei Bay area, Dent Province, Mt. Marapok, collector G., one ♂ and ♀ with label *Vestalis amoena* ♂, det. R. MARTIN (ML); 1 ♂ (ad.), NE Sarawak, Mt. Dulit, Borneo bor. (ML).

Male. — Immediately distinguished from *V. amoena* by the longer appendix inferior and the black labium. Also, the yellow spot at the base of the mandible is small and isolated, subtriangular in outline, while the 2nd antennal segment is either unmarked or carries a small basal spot anteriorly. Lastly, the lower parts of the thorax are much obscured, in one specimen even the yellow line bordering the second lateral suture has disappeared. Several other species, of course, do resemble *amabilis* very closely in colour, but in doubtful cases the shape of the appendages is conclusive. For neural characters and measurements, see Table II and III.

Female. — The three specimens attributed to this species all have the labium black but the yellow line bordering the palpi outwardly is broader than in the male. The labrum has a pair of widely separated yellow spots. Second antennal segment yellow anteriorly. There is much yellow colouring on the infraepisternites and lower parts of metapleurae, the stripe joining the second suture being twofold. Under surface obscured, not quite black, pruinescent blue.

Abd. + app. 37.5—39.0 mm, hind wing 33.5—33.8 mm.

Evidently a rare species restricted to certain parts of Borneo but keeping company where found with *amaryllis, amnicola, atropha* and *beryllae* (see Table I and maps, fig. 4).

Vestalis amnicola spec. nov.
(fig. 4, 7, 9)

Material. — Borneo: North Borneo (Sabah), 1 ♂ (ad., holotype), Kina Balu, coll. STAUDINGER, acq. 1903, with label *Vestalis amoena* Selys, det. R. MARTIN (ML); 1 ♂ (app. drawn, fig. 7, 9), SE slope of Mt. Kinabalu, 1650 ft., no. 21, Ranau, 6.X.1958, T. C. MAA (ex BISH, ML); 1 ♂ (ad.), Kina Balu, N Borneo, I.1894, leg. EVERETT, no. 5436 (SMF); 2 ♀ (1 juv.), same locality and dates, nos. 31279 and 31278 (SMF); 1 ♂, Kina Balu /91/ 161 (BM); 2 ♂ (one with intermediate abd.-segments missing), Kinabalu, STAUDINGER & BANG-HAAS vend., *V. gigantea* Förster, det. F. FÖRSTER (coll. J. COWLEY); 1 ♂, Kinabalu, 1914, J. C. MOULTON, *V. amoena*, det. F. F. LAIDLAW, ex coll. LAIDLAW & ROBERTS (coll. J. COWLEY); 1 ♂, Lewpu Aga House (Sandakan area?), 7.X.1920, *V. amoena*, det. F. F. LAIDLAW, ex coll. LAIDLAW (coll. J. COWLEY). 1 ♂, Sarawak, Mt. Dulit, R. Koyan, 2500 ft., 20.XI.1932, riverside, primitive forest, Oxford Univ. Exped., B. M. HOBBY & A. W. MOORE, H 619 (BM); 1 ♂, Sarawak, Mt. Dulit, 25.X.1932, house clearing, native collector, same exped. as before (BM).

Male. — Apart from the characters found in the anal appendages, the male of this new species can be recognized from its allies by (1) slightly more robust build, (2) closely reticulated wings and higher nodal index, and (3) more abruptly

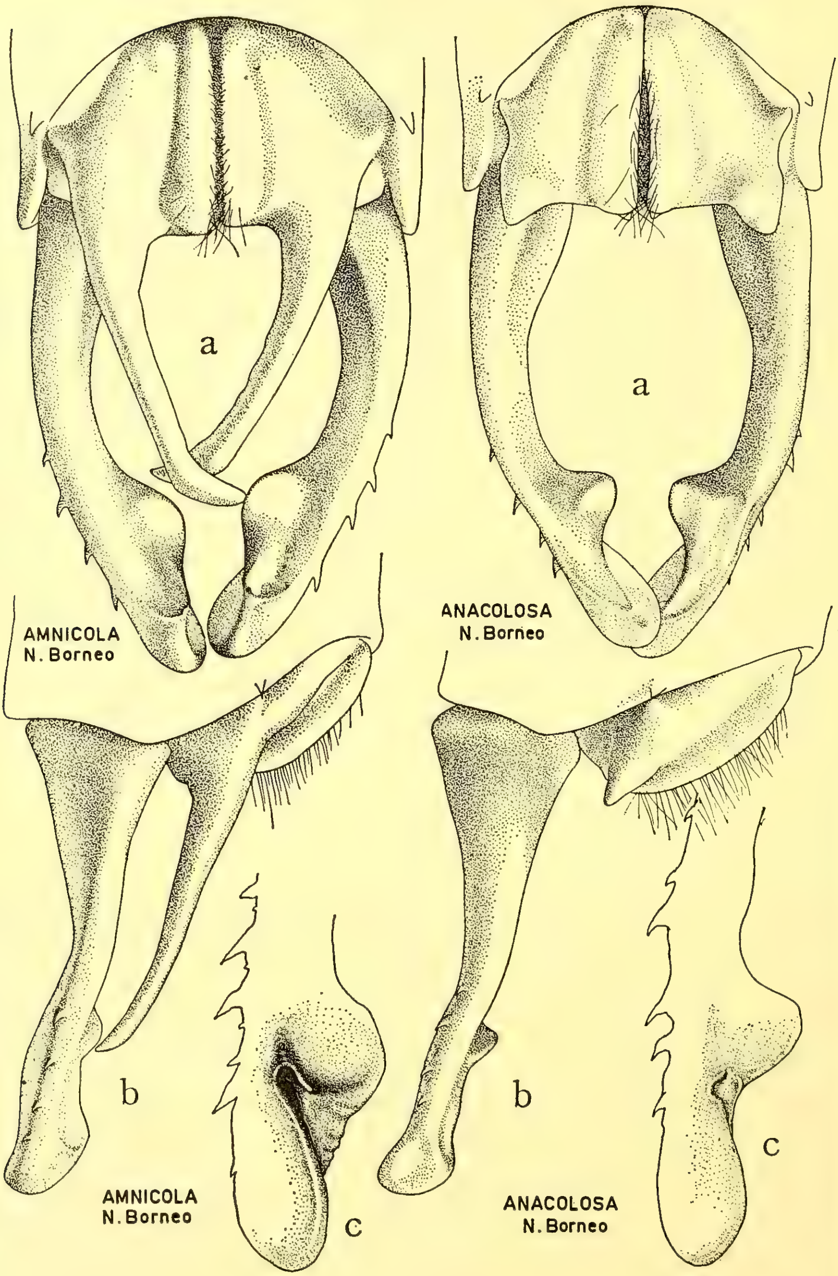


Fig. 7. Anal appendages of *Vestalis* species from Borneo. a, ventral, b, right lateral view; c, apex of left superior appendage more enlarged, dorsal view

broadened wings, the widest point of both fore and hind wing lying at a point a little beyond the level of the nodus, hence further distad than in the other species. There are also more divided cells between main sectors and supplements, the basal part of the Cu_1—Cu_2 area being a little wider than usual with more divided cells between them for a variable distance; in the right hind wing of one paratype (from Ranau, Mt. Kinabalu) this area for almost the whole length is two-celled, with 2—3 marginals. See also Table II.

For a colour description of the male, see *atropha* and *anacolosa.* All agree in having only a basal spot of yellow at the anterior face of the second antennal segment, and in the great majority the labrum is unspotted and distinctly metallic green. In the type the abbreviated metepimeral stripe joining the second suture is perfectly straight, rather broad though subinterrupted near its upper extremity, and there is also a small mesinfraepisternal spot.

The dimensions vary considerably in our series: the smallest male is from Lewpu Aga House (alt.?), measuring 41.4 mm for the abdomen, 33.5 mm for the hind wing. The largest males are amongst our series from Mt. Kinabalu and Mt. Dulit; no correlation exists between abdomen and wing lengths, and intermediate sizes are present from both localities. Many adults have the borders and extreme apices of wings markedly enfumed, the membrane itself remaining hyaline. Table III.

Female. — Only two examples of this sex can be assigned to *amnicola* with reasonable certainty. The labium is coloured as in the male. In one the labrum is yellow with a mid-basal point of black and a black anterior border, whilst in the other only a pair of transverse yellow spots are present.

Abd. + app. 40.0 mm, hind wing 35.0—35.2 mm.

Vestalis atropha spec. nov.
(fig. 4, 8)

Material. — B o r n e o : 1 ♂ (ad.), Sarawak, foot of Mt. Dulit, junction of rivers Tinjar and Lejok, 12.XI.1932, secondary forest, native collector, Oxford Univ. Exped., B. M. HOBBY & A. W. MOORE (BM); 1 ♂ (ad.), Sarawak, Mt. Dulit Trail, 10.VIII.1932, primitive forest, over stream, same exped. & collectors (BM); 1 ♂ (ad.), Sarawak, E of Mt. Dulit, Sungai Akah, 1.X.1920, collector? *V. amoena*, det. F. F. LAIDLAW, ex coll. LAIDLAW (coll. J. COWLEY); 3 ♂ 1 ♀ (ad.), sub *amoena*), "Sarawak", one with affix "Penrissen" (unknown handwriting) (IRSN). Holotype: ♂, Sarawak, Mt. Dulit Trail, 10.VIII.1932, Oxford Univ. Exped. (BM); paratypes of both sexes in (BM), (ML), (IRSN) and coll. J. COWLEY.

Male. — Labium black, yellow streaks only along outer margin of palpiger and basal half of first palpal segment. Mandible-bases with isolated yellow spot, very small and circular in the type, larger and rather more oval in the paratypes. Labrum black with faint metallic green gloss; anteclypeus obscured. Rest of head brilliant emerald green, the rear only feebly metallic and slightly pruinescent. Antenna black, second segment unmarked (type), or with roundish basal spot anteriorly (paratypes).

Synthorax with no other yellow markings than a metepimeral line bordering

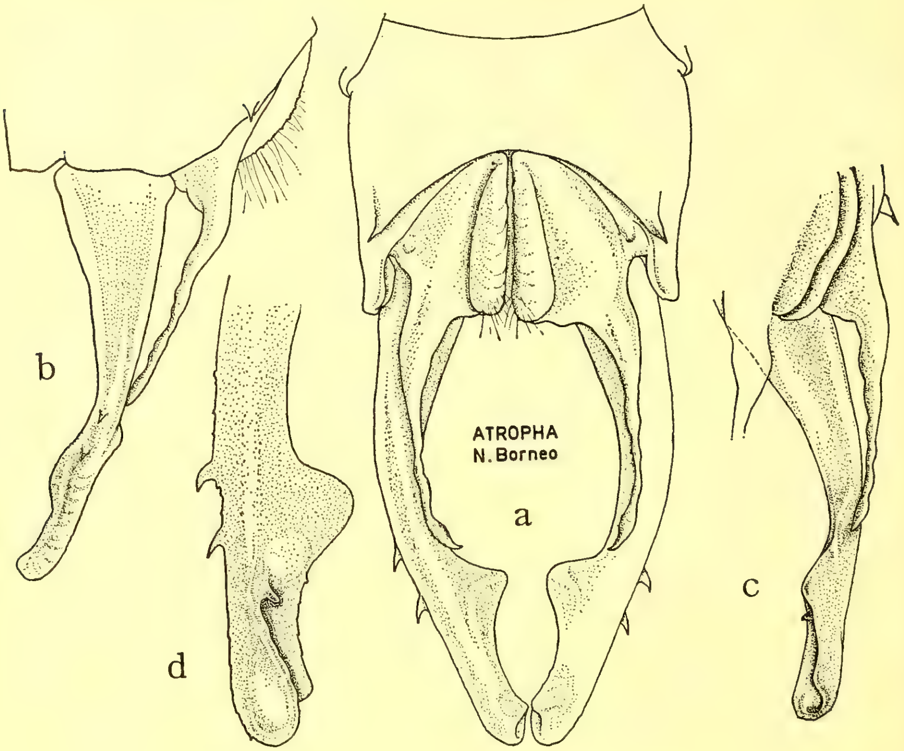


Fig. 8. Anal appendages of *Vestalis atropha* sp.n., ♂ holotype. a, ventral, b, right lateral, c, intero-ventral view; d, apex of left superior appendage more enlarged, dorsal view

the second lateral suture and a mere streak at latero-ventral border, the former being widest and somewhat broadened ventrad in the type, shorter and linear in the paratypes; lower areas of the sides wholly black (one paratype) or with vestigial mesinfraepisternal spot (holotype and one paratype). Thorax entirely black ventrally and like the lower pleural parts and coxae covered with light blue or grey-blue pruinescence.

Wings comparatively narrow and more pointed than in the allied species; apices and posterior margin of membrane slightly smoky or entirely hyaline. Neuration (Table II); there are one or two divided cells between Cu_1 and Cu_2 in the hind wings of the type but in the others there is only a single row.

Abdomen black with the usual brilliant peacock green gloss on the basal segments. Penis not differing from that of the other members of the group but anal appendages of characteristic shape and quite similar in all individuals (fig. 8).

Female. — Labium coloured as in the male. Base of mandible with large yellow spot surrounded by black. Labrum marked with a heavy T-shaped greenish black spot; a median transverse streak of yellow also on anteclypeus. Basal half of second antennal segment yellow anteriorly. Colour-pattern of synthorax as in most

other species, the lower parts with much yellow colouring, the line joining second suture twofold; ventral surface obscured in the middle.

$$\text{Nodal index } \frac{47.23.22.46;}{40.16.18.41} \; q \; \frac{3.3;}{2.3} \quad Cux \; \frac{7.7}{8.7}.$$

Dimensions. Male, see Table III. Female, abd. + app. 36.0 mm, hind wing 32.0 mm.

This new species is the smallest of the *V. amoena* group and can be at once distinguished from its allies by the long upcurved superior anal appendages and the curiously emaciated form of the inferior pair. The name is an allusion to the atrophied condition of the latter. The wings have a more open venation and are a trifle narrower and more pointed than in any of the others; the more distal position of the nodus is an additional feature of the insect.

Vestalis anacolosa spec. nov.

(fig. 2, 4, 7, 9)

Material. — North Borneo: 1 ♂ (holotype, app. & penis drawn, fig. 2), Sabah, E slope of Mt. Kinabalu, 10 miles N of Ranau, 1570 ft., Paring, 9.X.1958, T. C. MAA (ex BISH, ML).

As far as colour and markings are concerned, the unique specimen of this very distinct species does not seem to differ from fully adult examples of *V. amabilis, amnicola* and *atropha*, which are all of them equally dark-coloured insects, even the labrum being nearly always unspotted with yellow. For the sake of completeness the following characters are given in addition to those mentioned in the tables and key.

Labium black, palpiger and basal half of first palpal segment narrowly bordered with yellow, these tiny crescents sharply defined. Mouth-parts and adjoining parts of face black, genal area very shiny, anteclypeus dull. A large, isolated, subrotundate yellow spot at base of mandible. Head otherwise black with the usual brilliantly metallic emerald green shine, only the labrum and rear of the head but slightly lustrous, the latter somewhat pruinosed. Antenna black, anterior face of second segment with a pear-shaped basal yellow spot extending up for $^1/_2$ to $^1/_3$ the whole length. Yellow marks on thoracic segments restricted to tiny spots filling up the lower edges of the infraepisternites; a straight metepimeral line, incomplete on both ends, runs along second lateral suture. These lower parts, as well as the ventral surface and the coxae of legs, are covered with grey-blue pruinescence concealing most of the surface.

Wings rather pointed, membrane entirely hyaline. Neuration (Table II) without peculiarities; no duplicated cells between Cu_1—Cu_2.

Abdomen lacking yellow markings; colour black, segm. 1—3 and base of 4 metallic green, succeeding segments and anal appendages almost lustreless. Penis (fig. 2). Appendages (fig. 7, 9).

Female unknown.

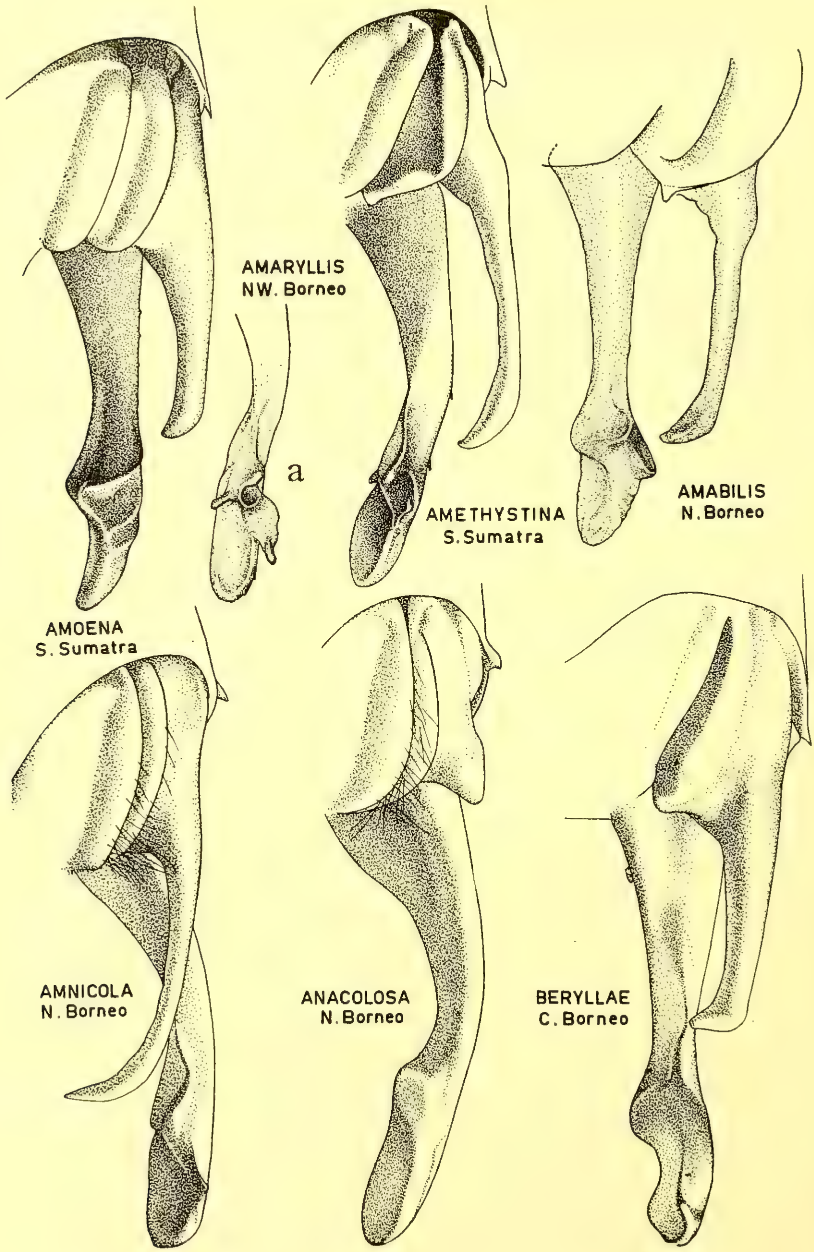


Fig. 9. Left pair of anal appendages of *Vestalis* species, oblique intero-ventral view; a, interior view of apex of right superior appendage of *V. amaryllis* sp.n., Mt. Santubong

Vestalis beryllae Laidlaw, 1915
(fig. 4, 9, 10)

Material. — B o r n e o : 1 ♂ (ad., holotype), labelled "Mt. Merinjak[1]), 29.5.14. / J. C. Moulton Type MSS" (BM); 1 ♂, Borneo (BM); 3 ♂ (ad., one with abd.-segm. 7—10 missing), W Sarawak: "Sarawak/53 Mt. Penrissen, Sarawak" (yellow, DE SELYS' writing), *"Vestalis elongata* S. mss." (ditto) (IRSN); 2 ♂ (1 juv.), Kinabalu, Borneo, ex coll. MACLACHLAN (BM); 1 ♀ (ad., allotype by present designation), Kina Balu, N Borneo, 1.1894, leg. EVERETT, *V. amoena* ♀, det. F. RIS, ded. R. MARTIN (SMF); 1 ♂ (ad.), NE Sarawak, Mt. Dulit, Borneo bor., *Vestalis elongata* nov. spec. (R. MARTIN's writing) (ML); 1 ♂ (ad., app. drawn, fig. 10), Central Borneo, Sungai Mandai hills, Mt. Liang Kubung (cave) near Nangaraun, 800 m, 10.III—5.V.1894, J. BÜTTIKOFER (ML); 1 ♂ (juv., penis dissected, fig. 10), Central East Borneo, Kutai, upper reaches of Mahakam river, Sungai Telen valley, Long Hut, 150 m, no. 50, 23.VIII.1925, H. C. SIEBERS (ML).

Male. — Labium, trochantin and apex of mandible black, as are the genae and a narrow polished area extending from below upwards along margin of compound eye as a gradually narrowed line tapering to a fine point and ceasing at a level of the posterior ocelli. Labrum, base of mandibles and clypeus emerald green; labrum with an impressed black spot in the middle at base and centre of anteclypeus also black and lustreless. Clypeus transverse, somewhat protuberant and swollen medially, about $2^1/_2$ times broader than deep; its anterior border rounded, the upper surface (postclypeus) transversely striate, moderately convex, with a shallow, dull black depression on either side. Second antennal segment metallic green, third segment dark bronze, flagellum black.

Pro- and synthorax metallic green, the carinae and sutural lines black as are also the lower parts of metapleurae including the second lateral suture. The metallic colour on either side of the latero-ventral border of metepimerum and second suture frequently acquire a more coppery tint. Ventral surface of thorax black, except the metasternum which is again metallic green, all parts more or less powdered with light blue. Legs black, the outer faces of all coxae metallic green to dark bronze.

Wings distinctly narrower and less expanded than in species of the *amoena* group, the postnodal portion lanceolate with bluntly rounded tips. Nodus more

---

[1]) Some difficulty was experienced in finding out the geographical position and altitude of the type locality of *V. beryllae* in Sarawak. The original description merely gives "Retuh" but the type-label indicates Mt. Merinjak, May 29, 1914. Dr. T. HARRISSON (in litt.) locates both of Mr. MOULTON's collecting places in the upper Baram river valley, over 50 miles distant from Mt. Murud in a northeasterly direction. A specimen of *Chlorogomphus dyak* Laidlaw is reported by its describer as having been taken by MOULTON on Mt. Merinjak on May 28, 1914, 2200 ft. It is evident, therefore, that *V. beryllae* in this area does not exceed the limits of the submontane forest zone. Other dragonflies collected by MOULTON about the same time and labelled "Mt. Murud" probably also originate further down the Baram and are from Murud Kechil, a much smaller peak than the true Murud, which was not climbed and explored until World War I by Messrs. E. MJÖBERG and T. HARRISSON, the latter having corrected its position and altitude on the existing maps.

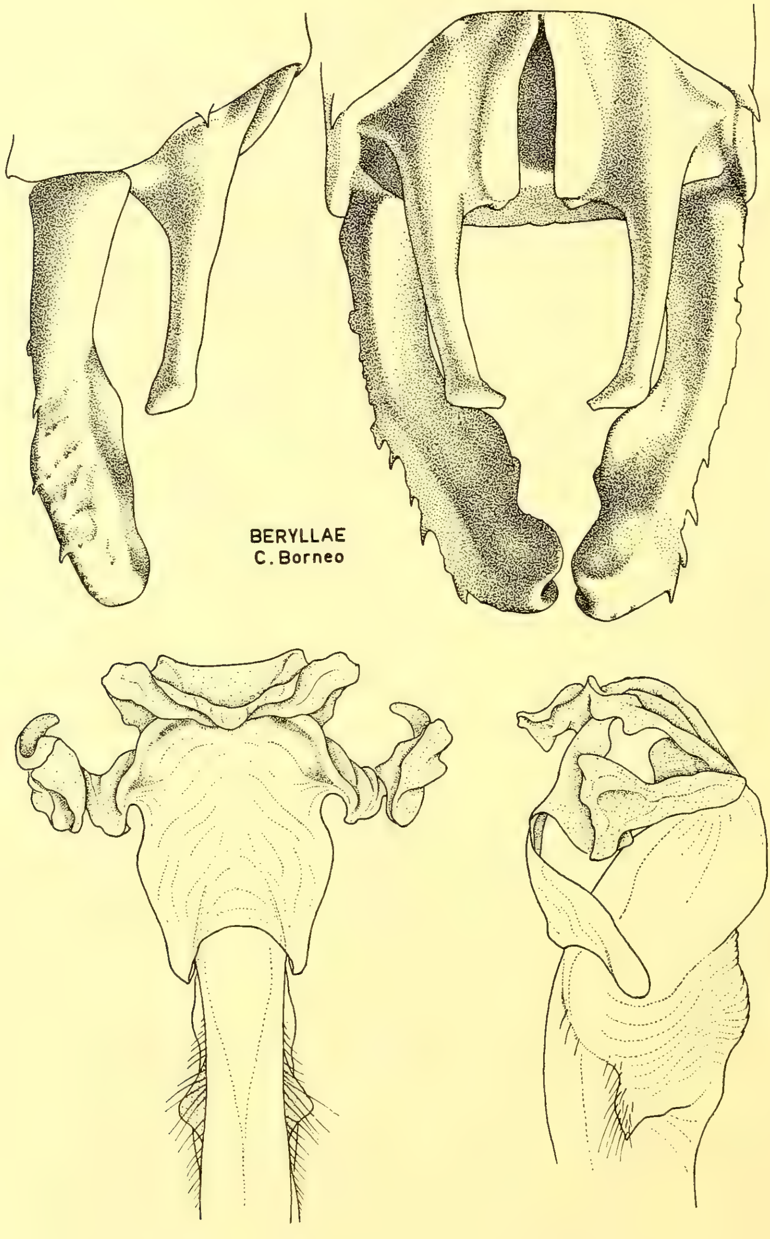


Fig. 10. *Vestalis beryllae* Laidlaw, ♂ Mt. Liang Kubung. Anal appendages, right lateral and ventral view, and apex of penis, ventral and right lateral view

recessed and main longitudinal veins straighter than in the *amoena* group of species. Neuration, see Table II; fore wing with one row of cells Cu_1—Cu_2, this area in hind wing slightly expanded sub-basally, usually commencing with three or more single cells followed for a variable distance by two rows and with 1—3 marginal cells. Membrane of both fore and hind wings evenly and rather strongly tinged with yellow in mature examples, extreme apices moreover slightly enfumed along margin.

Abdomen long and slender, from the base of segm. 7 to the end of 9 gradually a little expanded and at the same time dorso-ventrally flattened. All tergites brilliant metallic peacock green above, a little less shiny beneath. Anal appendages black, dorsal surface of both pairs slightly metallic bronze but inferiors usually with distinct metallic green lustre ventrally.

Penis as described on p. 330 and in the key (fig. 10). Anal appendages, fig. 9, 10).

The measurements of the entire series of males are:

Mt. Merinjak (holotype)	abd. + app.	73.5	hind wing	41.5	mm.
Mt. Penrissen	——	71.0	——	42.0	—
Mt. Penrissen	——	70.0	——	40.0	—
Mt. Penrissen	——	—	——	39.0	—
Mt. Kinabalu	——	68.5	——	39.0	—
Mt. Kinabalu	——	63.0	——	37.8	—
Mt. Dulit	——	67.0	——	40.0	—
Mt. Liang Kubung	——	65.0	——	36.5	—
Long Hut	——	64.0	——	36.5	—
"Borneo"	——	64.0	——	35.0	—

Female. — The specimen is fully coloured and agrees with the male in all but the sexual characters. Head without any pale markings; mouth-parts black, the mandible-bases and labrum emerald green. Sutural stripes and lower parts of synthorax all deep black. Wings slightly tinged yellowish. Cross-veins in $q\frac{4.4}{5.4}$; nodal index $\frac{64.27.29.64}{53.24.26.58}$. Arculus very oblique, at $Ax_{3\text{-}4}$ in all wings. In the fore wing there is only a single row of cells Cu_1—Cu_2 but in the hinder pair there are several duplicated cells between these veins; also, whereas Cu_2 in the fore wings is normal and flatly curved, this vein in the hinder pair is distinctly convex, approaching the condition found in *V. gracilis* Ramb. This is in conflict with an observation made by MAY (1935 : 213), whose statement only applies to the fore wing.

Dimensions: abd. + app. 49.0 mm, hind wing 40.0 mm, greatest breadth of hind wing 9.0 mm.

LAIDLAW's description of the colour and shape of the inferior anal appendages scarcely applies to the specimens before me. In July, 1964, I was able to compare these with the type in the British Museum and found that in all of them the inferior pair are more or less metallic green ventrally, the apices, though cylindrical, being rather abruptly inwardly curved.

As indicated earlier, the systematic position of this striking insect is puzzling.

Although agreeing with the typical members of the *V. amoena* series in many respects, it remains isolated structurally. Within the group it takes a position more or less comparable with that of the dark-winged *Neurobasis (Matronoides) cyaneipennis* Förster (also from Borneo) as opposed to the allied species-group of *N. chinensis* (L.). The most noteworthy features of *V. beryllae* are the extraordinary shape of the penis, the lack of yellow body-marks, and the slender form of body and wings. These characters are partly unisexual but decidedly striking. Unlike the aberrant *N. cyaneipennis*, the present species is not at all restricted to the higher altitudes of Borneo, but unfortunately nothing is yet known of its habits and life history.

IMMATURE STAGES
(fig. 11, 13)

The majority of the described Old World genera of Calopterygidae are now fairly well known from the ultimate instar larvae. Of the three Malaysian genera, the fullest account of *Vestalis* is the one given by RIS (1912) of *V. luctuosa* (Burm.) from Java. The characters of *Neurobasis chinensis florida* Hagen, also from Java, were summarized and illustrated more recently by LIEFTINCK (1955). The third and last Malaysian genus, *Echo* Selys, has not so far been described or figured.

I here offer camera lucida illustrations of full-grown examples of the *Neurobasis* just mentioned, as well as of *Echo uniformis* Selys and *Vestalis luctuosa* (Burm.), the last two from Sumatra. All were drawn from anaesthetized or freshly killed specimens collected between the years 1934 and 1941.

The three genera differ much between themselves in general appearance, *Neurobasis* approaching *Calopteryx* most closely in being of very slender form, with a small head and exceedingly long legs and caudal lamellae. *Vestalis* in every respect is more compactly built and has a broader head. Lastly, *Echo*, although possessing equally long legs and similarly shaped antennae, has a still larger and broader head, the whole body being more expanded. In this respect *Vestalis* takes a somewhat intermediate position between these two extremes (cf. fig. 11).

The structure of the labium shows corresponding differences in proportion. A comparison of this organ (fig. 12—13) reveals a deeply cleft median lobe in *Neurobasis* and *Vestalis,* the inner margin of the palpus carrying denticulations of two sizes. *Echo*, on the other hand, has a broader labium with less deeply incised midlobe, and a palpus with an evenly and more finely denticulate inner margin.

Analogous differences can be observed when comparing the shape of the caudal lamellae. Though in *Vestalis* the lateral gills bear a prominent mid-rib exteriorly, all three of them are plate-like, of the vertical lamellate type, whereas in *Echo* only the median gill is flattened, the lateral pair being triquetrous in cross-section with rows of short tubercular spines at the ridges. *Neurobasis* (and *Matrona* as well) takes a position between the former two genera in that the thickened median gill is spatulate towards the tip; otherwise they agree by having the lamellae of unequal length, strongly triquetrous and with denticulate carinae

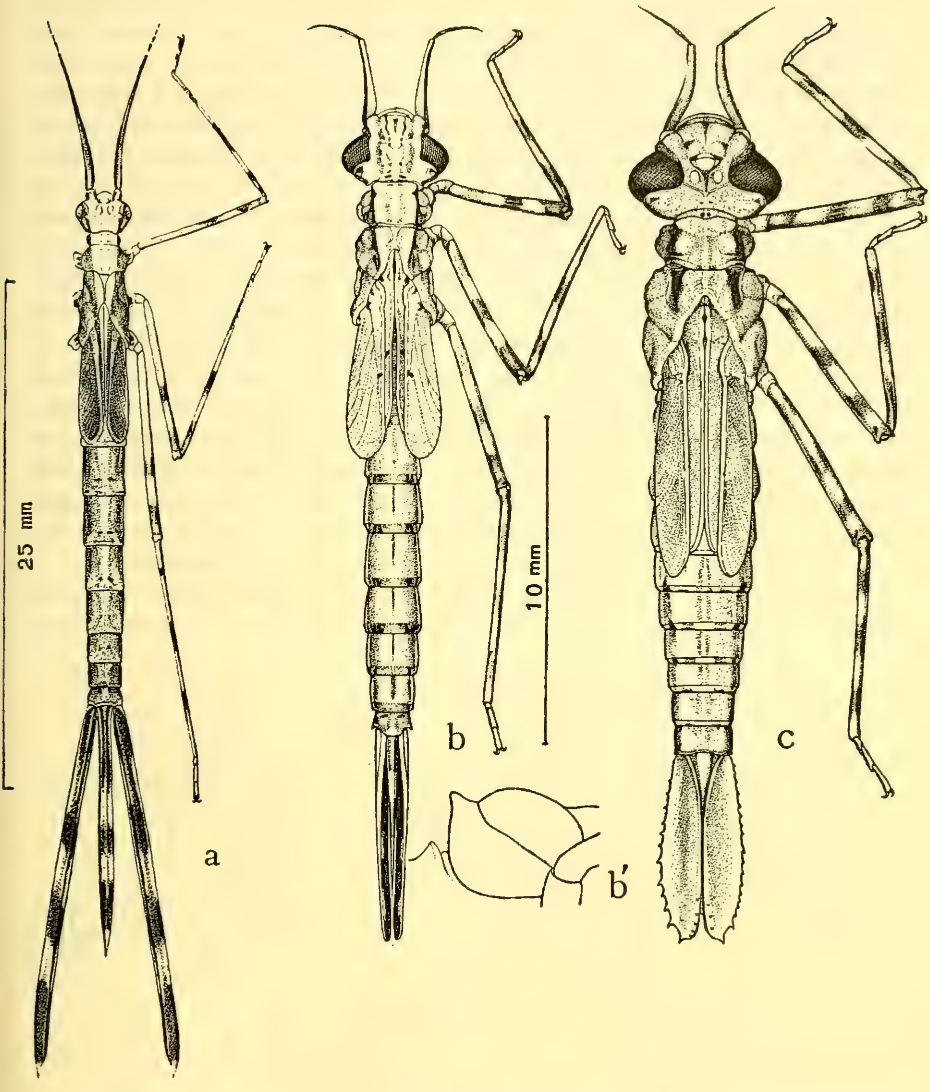


Fig. 11. Ultimate instar larvae of: a, *Neurobasis chinensis florida* Hagen, from West Java, Tjibarangbang, 13.XI.1938 (after LIEFTINCK, 1955); b, *Vestalis luctuosa* (Burm.), South Sumatra, Wai Tebu, XII.1934; b, right lateral view of head more enlarged, showing postocular tubercle and base of antennae; c, *Echo uniformis* Selys, from SW Sumatra, SE slope of Mt. Dempo, 1100 m, X.1941. Fig. 11b and c, same magnification

(cf. LIEFTINCK, 1955, fig. 5—6). *Neurobasis* conforms to the larva typified by *Calopteryx*, whereas *Echo* more closely approaches the East Asiatic *Mnais* (ASAHINA, 1956) and the Ethiopian genus *Sapho* (FRASER, 1951). Both of the latter, like *Echo*, have at least the lateral caudal gills modified and triquetrous. Apparently no published description or figure exist of the well-known Ethiopian genus *Phaon*, whose larva presumably recalls *Vestalis* in general appearance, agreeing with it in the essential characters.

The material at my disposal of *Vestalis* larvae pertaining to the *amoena* group is rather meagre and from different sources, as follows:

Malay Peninsula: 1 ♀ ult, Penang I., Batu Feringgi, 28.II.1963, forest brook, M. A. LIEFTINCK; 1 ♂ 3 ♀ ult, 2 ♀ penult and 3 ex. younger stages, Perak, Plus river, Sungai Yum, 15.III.1933, M. W. F. TWEEDIE; 1 ♀ exuvia, with freshly emerged imago, Selangor, Kuala Lumpur, Ulu Gombak, 16.III.1963, M. A. LIEFTINCK; 1 ♂ 1 ♀, penult, Johore, Tankak, 4.XI.1959, stream in rubber estate at foot of Mt. Ophir, close to Muar Reserve, 4.XI.1959, no. 68, D. S. JOHNSON; 1 ♀ ult, 1 ♀ penult, stream ca. 2 miles S of Suak, 10.VIII. 1958, D. S. JOHNSON. — Borneo: 3 young larvae, S. Borneo, Sampit area, Pemantan, brook on peaty soil near tributary of Sampit river, low country, ult. VII.1959, M. A. LIEFTINCK. All specimens are in the Leiden Museum.

These individuals very nearly agree with the more remotely allied species *V. luctuosa*, of which I have a fair number of specimens collected in West Java and

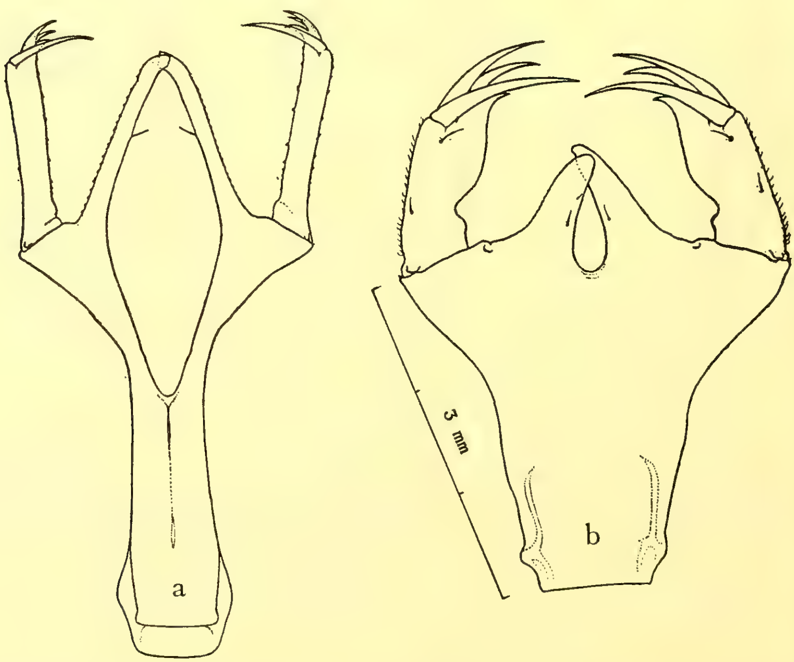


Fig. 12. Interior view of labium; a, *Neurobasis chinensis florida* Hagen, from West Java, Tjibarangbang, 13.XI.1938; b, *Echo uniformis* Selys, from South-west Sumatra, SE slope of Mt. Dempo, 1100 m, X.1941. Same magnification

South Sumatra. However, they can be at once distinguished from that species by the curiously obliquely truncated apex of the median caudal lamella (fig. 13), which in *luctuosa* is approximately of the same shape as the lateral pair (cf. Ris, 1912, fig. 24, with which our own specimens agree). This dissimilarity in the form of the caudal gills seems to be a feature common to all species of the *amoena* group, by which they can be easily recognized. Ris's description of the larva of *V. luctuosa* is very full, and I have been unable to detect any consistent differences between it and the *amoena* assemblage. The raised postocular tubercles, shown for *V. luctuosa* in profile view (fig. 11b'), are equally strongly developed in the *V. amoena* group, even the minute lateral ocellar warts, mentioned by Ris in his description of the *luctuosa* larva, being present in the specimens here treated. One of the few discrepancies is found in the shape of the median caudal gill, which in all specimens enumerated above is obliquely truncated apically, with a somewhat swollen dorsal margin and with the apex acuminate (fig. 13d). A further slight difference is found in the structure of the labium, the cleft of the median lobe in *luctuosa* being, perhaps, a little broader towards the bottom than it is in the *amoena* group, although I am doubtful whether this is a constant and reliable mark

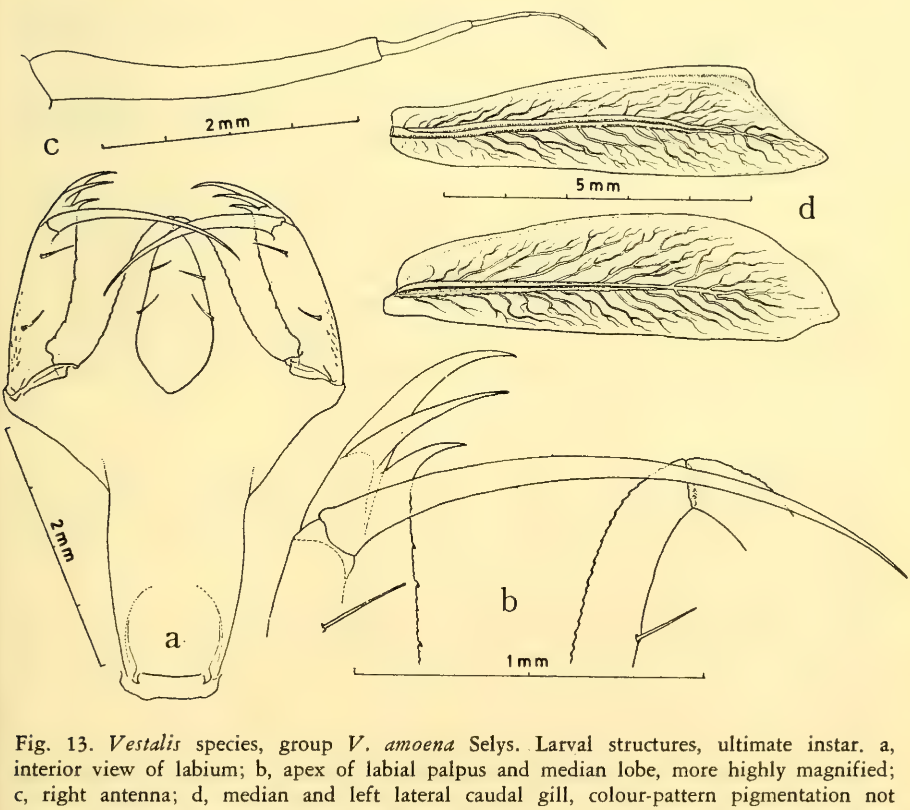


Fig. 13. *Vestalis* species, group *V. amoena* Selys. Larval structures, ultimate instar. a, interior view of labium; b, apex of labial palpus and median lobe, more highly magnified; c, right antenna; d, median and left lateral caudal gill, colour-pattern pigmentation not shown. Fig. 13a, b and d after specimen from Ulu Gombak, Malaya; fig. 13c after specimen from Batu Feringgi, Penang Island

of distinction. A characteristic feature of all *Vestalis* larvae is the great length and slender form of the end-hook at the labial palpus.

A peculiar feature of the antenna of these vestaline dragonfly larvae, which I have not found mentioned in the literature, is the presence of a vestigial — rarely incompletely developed — extra joint between the pedicel and the second segment. This intercalated minute segment is present in all individuals examined and is also shown in RIS's fig. 22 (loc. cit.) of the head of *V. luctuosa*. It is worth attention that the same structure occurs in the neotropical *Hetaerina macropus* Selys, well figured (though not mentioned) in a paper by GEIJSKES (1946, fig. 1). I have failed to find any trace of this additional segment in the larva of *Echo* and *Neurobasis*, which possess normal seven-segmented antennae.

I refrain from giving colour descriptions and measurements of the material in our collection. The body pattern of a Sumatran *V. luctuosa* is shown in fig. 11b, with which most of our "*amoena*" larvae agree. However, much variation exists in the development of dark bands and spots, including those ornamenting the gill lamellae. The young individuals I obtained from the almost black-bottomed rivulets in the peat marshes of southern Borneo, are considerably darker than the rest and have sharply defined black-ringed legs.

Measurements of structural details are given with the illustrations.

The specific identification of the present larvae must remain somewhat doubtful. When in the field, unfortunately no particular attention was paid to the imagines of the clear-winged members of the *V. amoena* group as it was not foreseen that more than one common and widespread species existed anywhere in the Malaysian Subregion. Hence no attempts were made to associate larval forms with adults occurring in any particular locality.

The larva from Penang Island was dredged up from among leafy trash in a shady brook at the banks of which adult individuals of *V. amethystina* were also taken. The transforming female from Ulu Gombak (Selangor) I collected at the same place where Mr. FURTADO took a male of *V. amoena* one year later. The immature larvae I obtained from a forest brook near Pemantan are possibly also *amoena*, this being the only member of the group collected in that locality.

ACKNOWLEDGEMENTS

The specimens recorded in this paper are deposited in the collections of various institutions for which abbreviations have been used in the text; these are specified as follows:

BISH — Bernice P. Bishop Museum, Honolulu, Hawaii
BM — British Museum (Natural History), London
Coll. J. COWLEY — Personal collection of Mr. JOHN COWLEY, Weston-super-Mare, Somerset
IRSN — Instituut Royal des Sciences Naturelles de Belgique, Bruxelles
MA — Zoölogisch Museum, Amsterdam
MCZ — Museum of Comparative Zoology, Harvard University, Cambridge, Mass.
ML — Rijksmuseum van Natuurlijke Historie, Leiden

SMF — Natur-Museum u. Forschungs-Institut Senckenberg, Frankfurt a.M.
ZMH — Zoologisches Staatsinstitut und Zoologisches Museum, Hamburg.

I wish to express my appreciation to several taxonomic specialists and friends who have given valuable assistance in the preparation of this research. I am indebted to the following colleagues in various institutions for the gift or loan of specimens and freedom of access to the collections under their care:

JOHN COWLEY (Weston-super-Mare), P. J. DARLINGTON, Jr. (MCZ), G. DEMOULIN (IRSN), J. I. FURTADO (Zoology Department, University of Kuala Lumpur, Malaya), J. L. GRESSITT and Miss S. NAKATA (BISH), D. E. KIMMINS (BM), G. KRUSEMAN (MA), H. T. PAGDEN (Penang, Malaya), HEINZ SCHRÖDER (SMF). I am also grateful to K. F. BUCHHOLZ, of the Museum A. Koenig (Bonn), who kindly complied with my request to sort out and make the necessary arrangements for a loan of the specimens contained in the F. RIS collection at Frankfurt (SMF).

This research being part of a program on dragonfly biology in Malaysia, I finally wish to extend my thanks to the Uyttenboogaart-Eliasen Stichting and the Netherlands Organisation for the Advancement of Pure Research (Z.W.O.), for provision of a travel grant conducting to field work in the Malay Peninsula during 1963.

REFERENCES

ALBARDA, H., 1881. — In VETH, Midden Sumatra Exped., 4, Nat. Hist. 5, Neuropt.: 6.

ASAHINA, S., 1956. — An annotated list of Japanese Odonata with brief descriptions of their larvae. Shin-Konchu 12 : 38—39, fig. 20.

COOMANS DE RUITER, L., 1936. — Biologische waarnemingen over beekjuffers van Borneo, etc. De Trop. Natuur, Weltevreden, 25 : 71—72, fig. 1.

FRASER, F. C., 1929. — Indian dragonflies. XXXIII. J. Bombay Nat. Hist. Soc. 33 : 585.

———, 1934. — The Fauna of British India, etc. Odonata II. London : 126, 132—133.

———, 1951. — Notes on Odonata in the Muséum National d'Histoire Naturelle. With descriptions of a new species and a new Zygopterous nymph. Revue française d'Ent. 18 : 99—101, fig.

GEIJSKES, D. C., 1946. — Observations on the Odonata of Tobago, B.W.I. Trans. R. Ent. Soc. Lond. 97 : 223—225, fig.

HAGEN, H. A., 1887. — Ueber *Neurobasis* und *Vestalis*. Verh. zool.-bot. Ges. Wien 37 : 648.

JOHNSON, C., 1961. — Breeding behaviour and oviposition in *Hetaerina americana* Fabricius and *H. titia* (Drury) (Odonata). Can. Entomologist 93 : 260—266, fig.

KENNEDY, C. H., 1920a. — The phylogeny of the zygopterous dragonflies as based on the evidence of the penes. Ohio J. Sci. 21 : 24, pl. 2 fig. 46—47.

———, 1920b. — Forty-two hitherto unrecognized genera and subgenera of Zygoptera. Ohio Sci. J. 21 : 83.

LAIDLAW, F. F., 1902. — On a collection of dragonflies made by members of the Skeat Expedition in the Malay Peninsula in 1899—1900. Proc. Zool. Soc. Lond. : 87.

———, 1903. — Odonata, pt. I. Report on the Dragon Flies. Fascic. Malayenses, Zool. 1 : 193.

———, 1915a. — Contributions to a study of the dragonfly fauna of Borneo. Part 3. A collection made on Mount Kinabalu by Mr. J. C. Moulton in September and October 1913. Proc. Zool. Soc. Lond. : 30—31.

———, 1915b. — Some additions to the dragonfly fauna of Borneo. Sarawak Mus. Journ. 2 : 273.

LAIDLAW, F. F., 1920. — Contributions to a study of the dragonfly fauna of Borneo, Part 4. A list of species known to occur in the island. Proc. Zool. Soc. Lond. : 326.

———, 1923. — A survey of the dragonfly fauna of the Malay Peninsula, with notes on that of neighbouring countries. Part I. J. Mal. Br. R. As. Soc. 1 : 332.

LIEFTINCK, M. A., 1934. — An annotated list of the Odonata of Java, with notes on their distribution, habits and life-history. Treubia (Buitenzorg) 14 : 450 (note in Appendix).

———, 1954. — Handlist of Malaysian Odonata. A Catalogue of the dragonflies of the Malay Peninsula, Sumatra, Java and Borneo, including the adjacent small islands. Treubia (Bogor) 22, Suppl. : 21, 175 (cat.).

———, 1955. — Notes on Australasian species of *Neurobasis* Selys (Odonata). Nova Guinea, new ser., 6 : 155—158, fig.

MAY, E., 1935. — Über die Genera *Vestalis* Selys, *Vestinus* Kennedy und *Vestalaria* n.g. Senckenbergiana 17 : 207—218, fig.

NEEDHAM, J. G., 1930. — A manual of the dragonflies of China, etc. Zool. Sinica A 11 : 208—209, pl. 17, fig. 2.

RIS, F., 1912. — Über Odonaten von Java und Krakatau gesammelt von Edward Jacobson. Tijdschr. v. Ent. 55 : 177—180, pl. 8 fig. 21—25.

———, 1927. — Odonaten von Sumatra gesammelt von Edward Jacobson. Zool. Meded. Leiden 10 : 10.

SCHMIDT, E., 1915. — Vergleichende Morphologie des 2. und 3. Abdominalsegments bei männlichen Libellen. Zool. Jahrb. 39 : 144, pl. 11 fig. 45.

———, 1934. — Odonata der Deutschen limnologischen Sunda-Expedition. I. Imagines. Etc. Archiv f. Hydrobiol. Suppl. 13 : 333.

SELYS LONGCHAMPS, E. DE, 1853. — Synopsis des Caloptérygines. Bull. Acad. Belg. 20, Annexe : 25—26.

———, 1873. — Troisièmes additions au Synopsis des Caloptérygines. Bull. Acad. Belg. (2) 35 : 475.

——— and H. A. HAGEN, 1954. — Monographie des Caloptérygines. Mém. Soc. Sci. Liège 9 : 82—83, pl. 8 fig. 6.

WILLIAMSON, E. B., 1904. — The dragonflies (Odonata) of Burma and Lower Siam. — I. Subfamily Calopteryginae. Proc. U. S. Nat. Mus. 28 : 183.

ZEUNER, F. E., 1943. — Studies in the systematics of *Troides* Hübner (Lepidoptera Papilionidae) and its allies; distribution and phylogeny in relation to the geological history of the Australasian Archipelago. Trans. Zool. Soc. Lond. 25 : 107—184, fig. 1—115.

Tijdschrift voor Entomologie

Het verschijnt in één deel van 350—450 bladzijden per jaar, bestaande uit enkele afleveringen.

Entomologische Berichten

Deze zijn bestemd voor de publicatie van kortere artikelen, faunistische notities etc., alsmede van de Verslagen der Vergaderingen en van mededelingen van het bestuur. Zij verschijnen twaalf maal per jaar in een aflevering van 16 of meer bladzijden, die samen een deel vormen.

Trichopterorum Catalogus

Deze Catalogus van F. C. J. Fischer wordt door de Vereeniging voor rekening van de auteur uitgegeven. Alle bekende recente en fossiele soorten van de gehele wereld met hun synoniemen worden er in behandeld. Delen I en II kosten f 39.— per stuk, delen III—V: f 45.—. Er zullen in totaal 15 delen verschijnen. Van alle delen zijn ook éénzijdig bedrukte exemplaren beschikbaar. De prijsverhoging hiervoor bedraagt f 2.50.

Entomologia Experimentalis et Applicata

Dit tijdschrift wordt uitgegeven door de Noord-Hollandse Uitgevers Maatschappij te Amsterdam in opdracht van de Vereeniging. Het publiceert artikelen over experimentele biologie en oekologie bij insecten en andere land-arthropoden. Het verschijnt vier maal per jaar en bevat 320 bladzijden. De prijs voor leden bedraagt f 25.—, voor niet-leden f 40.— per jaar.

Alle zakelijke correspondentie betreffende de Vereeniging te richten aan de Secretaris, W. Hellinga, Weesperzijde 23II, Amsterdam-O.

Alle correspondentie over de redactie van het Tijdschrift voor Entomologie en de Monographieën te richten aan de Redacteur, Dr. A. Diakonoff, Rijksmuseum van Natuurlijke Historie, Leiden.

Alle correspondentie over de redactie van de Entomologische Berichten te richten aan de Redacteur, B. J. Lempke, Oude IJselstraat 12III, Amsterdam-Z. 2.

Alle correspondentie over de redactie van Entomologia Experimentalis et Applicata te richten aan de Redacteur, Dr. P. A. van der Laan, Lab. voor Toegepaste Entomologie, Linnaeusstraat 2 B, Amsterdam.

Alle betalingen te richten aan de Penningmeester, Drs. H. Wiering, Doorntjes 29, Bergen (N.H.), postgiro 188130, ten name van de Nederlandsche Entomologische Vereeniging te Bergen (N.H.).

Alle correspondentie betreffende de Bibliotheek der Vereeniging te richten aan de Bibliotheek, Zeeburgerdijk 21, Amsterdam-O.

Notice to Subscribers

All correspondence referring to subscriptions and exchange of the periodicals of the Netherlands Entomological Society should be addressed to the Librarian, Zeeburgerdijk 21, Amsterdam-O, Netherlands.

NOTICE TO CONTRIBUTORS

Contributors will receive free of charge fifty reprints of their papers, joint authors have to divide this number between them at their discretion. Additional reprints may be ordered when returning proofs.

Manuscripts should be written in Dutch, English, French, German or Italian. If they contain descriptions of new genera, species, etc., they should be in one of the four last mentioned languages.

The author should communicate with the editor before submitting his manuscript. He will enclose with manuscript a Synopsis (Abstract), styled according to recommendations of the UNESCO (style rules will be provided by the editor) and, if needed, a Summary. Papers in Dutch should contain an Abstract and/or a Summary in one of the four other languages.

Manuscripts should be typewritten in double spacing on only one side of the paper, with a margin of at least three cm at the left side of each sheet. Paragraphs should be indented. Carbon copies cannot be accepted, as handling makes them illegible.

Captions for text figures and plates should be written on a separate sheet in double spacing, numbered consecutively in arabic numerals; the use of a, b, c, or any other subdivision of the figure numbering should be avoided.

Drawings for reproduction should be on good paper in Indian ink, preferably at least one and a half times as large as the ultimate size desired. Lettering should be uniform, and, after reduction, of the same size. Photographs should be furnished as shiny positive prints, unmounted. Plates should be arranged so as to fill a whole page (11.5 x 19 cm) of the *Tijdschrift*, or a portion thereof, captions included. Combinations of illustrations into groups are preferable to separate illustrations, since there is a minimum charge per block.

Names of genera and lower systematic categories, new terms and the like are to be underlined by the author in the manuscript by a single straight line. Any other directions as to size or style of the type are given by the editors, not by the author. Italic type or spacing to stress ordinary words or sentences is to be avoided. Dates should be spelled as follows: either "10.V.1948" or "10 May, 1948". Other use of latin numerals should be avoided, as well as abbreviations in the text, save those generally accepted. Numbers from one to ten occurring in the text should be written in full, one, two, three, etc. Titles must be kept short. Footnotes should be kept at a minimum.

Bibliography should not be given in footnotes but compiled in a list at end of the paper, styled as follows:

Mosley, M. E., 1932, "A revision of the European species of the genus *Leuctra* (Plecoptera)". — Ann. Mag. Nat. Hist. [10] 10 (3): 1—41, pl. 1—5, fig. 1—57. Number of issue should only be added (in parentheses) when it has individual pagination.

Text references to this list might be made thus:
"Mosley (1932) says...." or "(Mosley, 1932)".

The editors reserve the right to adjust style to certain standards of uniformity.

Manuscripts and all communications concerning editorial matters only should be sent to: Dr. A. DIAKONOFF, Rijksmuseum van Natuurlijke Historie, Leiden, The Netherlands.

DEEL 108 AFLEVERING 12 *) 1965

TIJDSCHRIFT VOOR ENTOMOLOGIE

UITGEGEVEN DOOR

DE NEDERLANDSCHE ENTOMOLOGISCHE VEREENIGING

INHOUD:

Tijdschrift voor Entomologie, deel 108, afl. 12	Gepubliceerd 30-XII-1965

*) Met titelpagina en inhoud

Nederlandsche Entomologische Vereeniging

De contributie voor het lidmaatschap bedraagt f 15.—, voor student-leden f 2.50, per jaar. — Begunstigers betalen jaarlijks tenminstet f 15.—.

De leden, behalve de student-leden, ontvangen gratis de *Entomologische Berichten*, waarvan de prijs voor student-leden f 1.50 per jaar, voor niet-leden f 20.— per jaar en f 2.— per nummer bedraagt.

De leden kunnen zich voor f 10.— per jaar abonneren op het *Tijdschrift voor Entomologie*; hiervan bedraagt de prijs voor niet-leden f 35.— per jaar.

De eerder verschenen publicaties der Vereeniging zijn voor de leden tegen verminderde prijzen verkrijgbaar. De Vereeniging geeft de volgende publicaties uit.

MONOGRAPHIEËN VAN DE NEDERLANDSCHE ENTOMOLOGISCHE VEREENIGING

Deze worden met onregelmatige tussenpozen uitgegeven. Er zijn reeds verschenen:

— F. T. Valck Lucassen et al. — Monographie du genre Lomaptera Gory & Percheron (Coleoptera, Cetoniidae), prijs f 50.—.

1. A. J. Besseling. — De Nederlandse Watermijten (Hydrachnellae Latreille, 1802), prijs f 25.—.

DIE GATTUNGEN DER PALAEARKTISCHEN TORTRICIDAE.
II. DIE UNTERFAMILIE OLETHREUTINAE.

6. Teil *)

VON

NIKOLAUS S. OBRAZTSOV
Sea Cliff, New York, U.S.A.

(MIT ABBILDUNGEN 178—191 und 7 TAFELN)

Abstract

The genus *Epiblema* Hübner is revised from taxonomic point of view; the species are catalogized and in certain cases annotated. One species is placed in the genus *Thiodia* Hübner.

Nachtrag zu: 78. Gattung **Thiodia** Hb., 1825

(OBRAZTSOV, 1964, Tijdschr. v. Ent. 107 : 17—24)

In seiner Monographie bildete KENNEL (1921: t. 21 fig. 3) als *fessana* Mn. eine Art ab, die man nur als zu *Eucosma* Hb. oder *Pelochrista* Ld. gehörend bestimmen könnte. Als ich bei der Bearbeitung für meine Revision an diese Gattungen gelangte und den *fessana*-Typus untersuchte, stellte ich fest, daß diese eine *Thiodia*-Art ist. Das von KENNEL als *fessana* abgebildete Männchen erwies sich dabei als eine *Eucosma*-Art, nämlich *E. recentana* (Zerny), die in meiner Revision an der entsprechenden Stelle angeführt wird. Nachstehend berichtige ich den begangenen Fehler und führe *fessana* an ihrer einschlägigen systematischen Stelle an. In der Artliste wäre es wohl das Richtigste, diese Art nach *Th. caradjana* (Kenn.) einzureihen. Das untersuchte *fessana*-Exemplar ist ihr Holotypus: Männchen (Genitalpräparat No. V. 26), Güllek, Karaman, Kleinasien, 1873 (HABERHAUER); Wiener Naturhistorisches Museum.

Th. fessana (Mn.) comb. nova *
fessana MANN, 1873, Verh. zool.-bot. Ges. Wien 23: 573 (*Grapholitha*). — STAUDINGER & REBEL, 1901: 115, No. 2068; diese Arbeit: Taf. 16 Fig. 1, 2 (Falter, ♂-Genitalien). — Kleinasien.

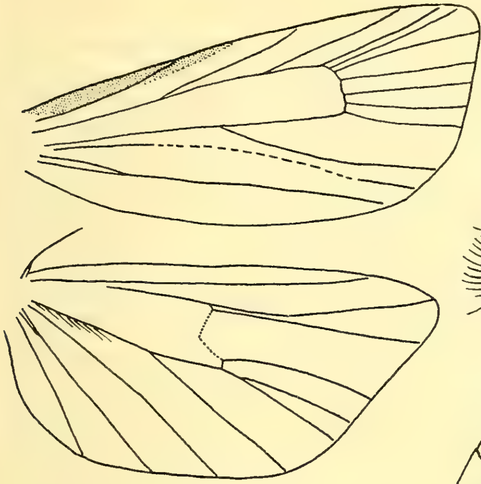
87. Gattung **Epiblema** Hb., 1825

Typus generis (selectus): *Phalaena Tinea foenella* L., 1758 (= *Phalaena Tortrix scopoliana* Schiff., 1776) [FERNALD, 1908, Gen. Tortr.: 6].

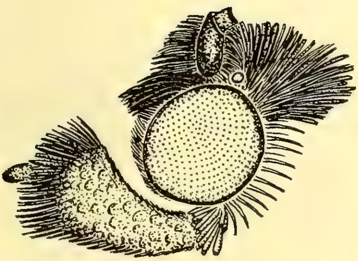
*) Dieser Teil der Revision wurde mit Unterstützung der *U.S. National Science Foundation* zur Publikation vorbereitet. Die sprachliche Korrektur verdankt der Verfasser Herrn J. K. OJA (Sea Cliff, N.Y.).

Phalaena Tinea (part.): LINNÉ, 1758, Syst. Nat. ed. 10: 536.
Phalaena Tortrix (part.): LINNÉ, 1758, op. cit.: 823.
Phalaena (part.): SCOPOLI, 1763, Ent. Carn.: 233.
Pyralis (part.): FABRICIUS, 1775, Syst. Ent.: 654.
Tinea (part.): FABRICIUS, 1775, op. cit.: 659.
Tortrix (part.): ILLIGER, 1801, Syst. Verz. Schm. Wien. Geg. 2: 57.
Olethreutes (part.): HÜBNER, 1822, Syst.-alph. Verz.: 58.
Epiblema HÜBNER, 1825, Verz. bek. Schm.: 375.
Epinotia (part.): HÜBNER, 1825, op. cit.: 377.
Notocelia HÜBNER, 1825, op. cit.: 380. Typus generis (selectus): *Phalaena Tortrix uddmanniana* L., 1758 (= *Olethreutes achatana* Hb., 1822, non F.) [WESTWOOD, 1840, Synops. Gen.: 108].
Hedya (part.): HÜBNER, 1825, op. cit.: 380.
Aspis TREITSCHKE, 1829, Schm. Eur. 7: 231. Typus generis (monotyp.): *Phalaena Tortrix uddmanniana* L., 1758 (= *Pyralis solandriana* F., 1775, non L.). Nom. praeocc. in Reptilia (*Aspis* Laur., 1768).
Thirates (part.): TREITSCHKE, 1829, op. cit.: 233.
Spilonota (part.): STEPHENS, 1829, Syst. Cat. Brit. Ins. 2: 174.
Paedisca (part.): TREITSCHKE, 1830, Schm. Eur. 8: 196.
Aspidia DUPONCHEL, 1834, Hist. Nat. Lép. France, 9: 20. Typus generis (heredit.): *Phalaena Tortrix uddmanniana* L., 1758. Nom. substit. pro *Aspis* Tr., 1829.
Spilonota (*Epinotia*) (part.): STEPHENS, 1834, Illustr. Brit. Ent., Haust. 4: 93.
Sciaphila (part.): TREITSCHKE, 1835, Schm. Eur. 10 (3): 87.
Carpocapsa (part.): DUPONCHEL, 1835, Hist. Nat. Lép. France 9: 259.
Ephippiphora (part.): DUPONCHEL, 1836, Hist. Nat. Lép. France 9: 326.
Spilonota (*Halonota*) (part.): WOOD, 1839, Ind. Ent.: 136.
Tortrix (*Paedisca*) (part.): ZELLER, 1843, Stett. Ent. Ztg. 4: 150.
Pardia GUENÉE, 1845, Ann. Soc. Ent. France (2) 3: 155. Typus generis (monotyp.): *Phalaena Tinea cynosbatella* L., 1758 (= *Phalaena Tortrix tripunctana* Schiff., 1776).
Eriopsela (part.): GUENÉE, 1845, ibid.: 163.
Euchromia (part.): HERRICH-SCHÄFFER, 1851, Syst. Bearb. Schm. Eur. 4: 205.
Spilonota (*Hedya*) (part.): STEPHENS, 1852, List Specim. Brit. Anim. 10: 30.
Halonota (*Epinotia*) (part.): STEPHENS, 1852, op. cit.: 45.
Halonota (*Epiblema*) (part.): STEPHENS, 1852, op. cit.: 46.
Sericoris (non Tr.): LAHARPE, 1858, Neue Denkschr. allg. Schweiz. Ges. ges. Naturwiss., Faune Suisse 6: 64.
Halonota (part.): STAINTON, 1858, Man. Brit. Butt. & Moths 2: 211.
Cacochroea LEDERER, 1859, Wien. Ent. Mschr. 3: 331, 337. Typus generis (monotyp.): *Paedisca grandaevana* Z., 1846.
Grapholitha (*Paedisca*) (part.): LEDERER, 1859, ibid.: 335.
Monosphragis CLEMENS, 1860, Proc. Acad. Nat. Sci. Philad. 12: 354. Typus generis (monotyp.): *Monosphragis otiosana* Clem., 1860.
Grapholitha (*Cacochroea*): HEINEMANN, 1863, Schm. Dtschl. u. Schweiz (2) 1 (1): 141.
Euryptychia CLEMENS, 1865, Proc. Ent. Soc. Philad. 5: 140. Typus generis (monotyp.): *Hedya scudderiana* Clem., 1860 (= *Euryptychia saligneana* Clem., 1865).
Grapholitha (part.): MANN, 1866, Verh. zool.-bot. Ges. Wien 16: 347.
Grapholitha (*Cacochroa*): WOCKE, 1871, Stgr.-Wck. Cat. Lep. eur. Faun.: 252.
Pammene (non Hb.): BANKES, 1907, Ent. Mo. Mag. 43: 181.
Eucosma (part.): MEYRICK, 1927, Revis. Handb. Brit. Lep.: 542.
Epiblema (*Pardia*): OBRAZTSOV, 1946, Zschr. Wien. Ent. Ges. 30: 36.
Epiblema (*Notocelia*): OBRAZTSOV, 1946, ibid.: 36.
Cacochroa: SWATSCHEK, 1958, Abh. Larvalsyst. Ins. 3: 150.

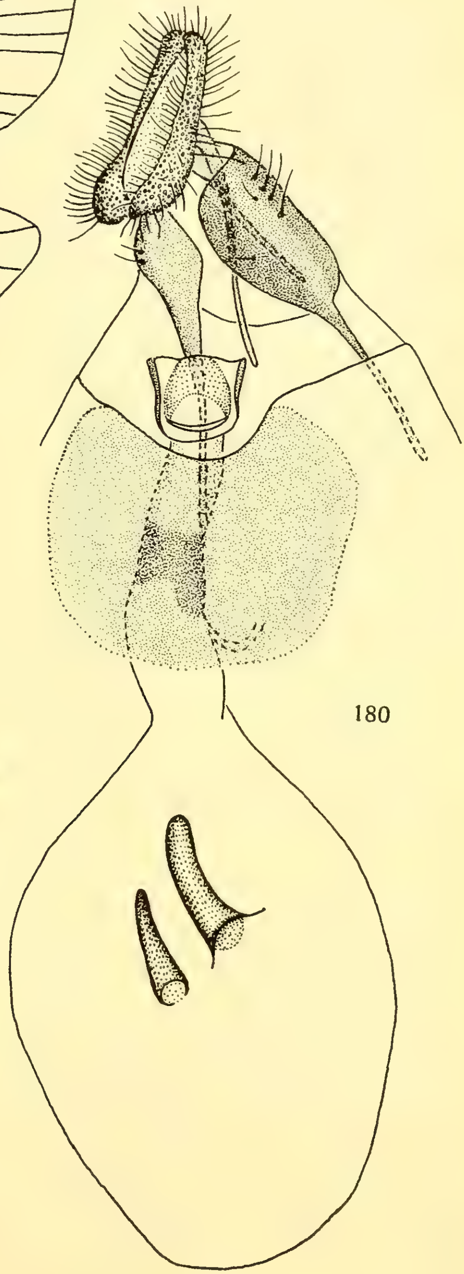
Kopf (Abb. 179, 182, 185) rauh beschuppt, mit einem zwischen den Fühlern nach vorn gerichteten Stirnschopf. Fühler einfach oder mehr oder weniger stark doppelt gezähnt, insbesondere gegen die Spitzen, und in der Regel mäßig bis kurz



178



179



180

Gattung *Epiblema* Hb. (Untergattung *Epiblema* Hb.): *E.* (*E.*) *foenella* (L.). Abb. 178: Männchen, Geäder. Abb. 179: Idem, Kopf. Abb. 180: Weibliche Genitalien, Präparat No. 793-Obr., England (Morley); A.M.N.H.

bewimpert, bei den Weibchen nur mehr kurz und sparsam beborstet. Labialpalpen stets länger als der Augendurchmesser, nach vorn gestreckt und meistens leicht aufgebogen; 2. Glied distal durch Schuppen erweitert; Terminalglied kurz bis mäßig lang, abgerundet, meistens sichtbar oder mehr oder weniger in der Beschuppung des 2. Gliedes verborgen. Saugrüssel entwickelt. Thorax mit einem Hinterschopf oder glatt.

Vorderflügel (Abb. 178, 181, 184) glatt beschuppt, länglich und öfters ziemlich breit; Costa sanft gebogen bis fast gerade; Apex abgerundet; Termen flach, leicht schräg bis fast vertikal; Tornus breit abgerundet; Dorsum flach bis etwas gebaucht; Costalumschlag beim Männchen stets vorhanden. 12 Adern, alle getrennt; S gewöhnlich leicht eingebogen; R_1 entspringt an, vor oder etwas nach der Mitte der Mittelzelle; R_2 etwas näher zu R_3 als zu R_1; R_3 und R_5 mehr oder weniger stark zu R_4 genähert, dieser stets näher stehend als R_2 zu R_3; R_4 mündet in die Costa kurz vor dem Apex, R_5 in das Termen; Innenader der Mittelzelle fehlt in der Regel; Adern R_5 bis M_3 verschiedenartig voneinander entfernt; Cu_1 entspringt aus dem unteren Winkel der Mittelzelle und ist von M_3 nicht weniger als die letztere von M_2 entfernt; Cu_2 entspringt deutlich vor dem letzten Drittel der Mittelzelle und läuft zum oberen Teil des Tornus; A_1 wenigstens am Tornus deutlich; Basalgabel A_{2+3} nicht länger als ein Viertel der ganzen Ader.

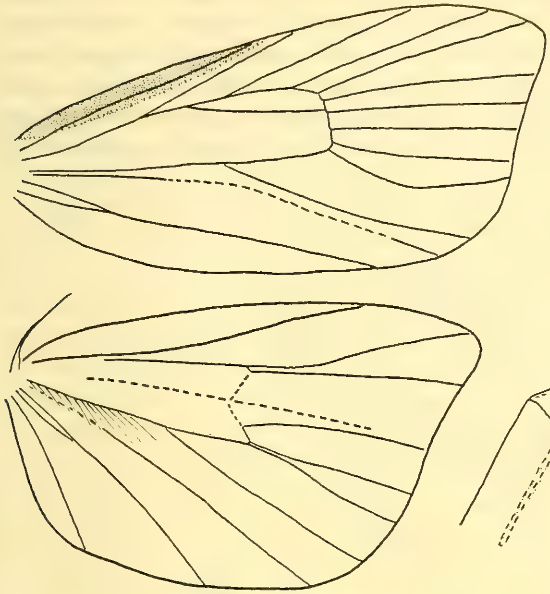
Hinterflügel (Abb. 178, 181, 184) abgerundet-trapezförmig, breiter als die Vorderflügel; Costa leicht wellig bis fast gerade; Apex abgerundet; Termen gerade oder ganz sanft eingezogen; Tornus sehr breit abgerundet; die äußere Hälfte des Dorsum fast gerade, die innere plötzlich stark ausgebogen[1]); Cubitus behaart. 8 Adern; S etwas wellig bis fast gerade; R und M_1 an der Basis dicht nebeneinander, verlaufen eine Strecke parallel oder sind gestielt, dann divergieren sie allmählich auseinander und umfassen den Apex; M_2 zur Basis sehr deutlich geneigt, der Cu_1 stark genähert oder von dieser etwas entfernt; M_3 und Cu_1 gestielt und entspringen aus dem unteren Winkel der Mittelzelle; Cu_2 entspringt an oder etwas vor dem letzten Drittel der Mittelzelle; alle drei Analadern entwickelt; A_2 mit einer Basalgabel.

Männliche Genitalien (Abb. 186—188). Tegumen mehr oder weniger breit, dorsal meistens höckerweise gewölbt ohne einen echten Uncus zu bilden; Pedunculi breit. Valva länglich, mit einem etwas verschiedenartig gestalteten, mit einer Corona aus starken Stacheln bedeckten Cucullus; dessen Unterwinkel ohne Pollex und einen Analdorn; Sacculus gerade oder ausgebogen, mit einem mehr oder weniger deutlichen Außenwinkel und vom Cucullus durch einen mehr oder weniger merklichen Valvenhals abgetrennt; Basalaushöhlung der Valva groß, wenigstens mit einem mehr oder weniger stark sklerotisierten Pulvinus an ihrem Außenrande; Processus basalis wohl entwickelt. Socii breit, mehr oder weniger lang, bandförmig, hängend; Gnathos schwach sklerotisiert. Anellus typisch „olethreutoid"; Caulis breit, in der Regel kurz, um Coecum penis trichterförmig erweitert. Aedoeagus dick, etwa kegelförmig; Cornuti lang, stachelförmig.

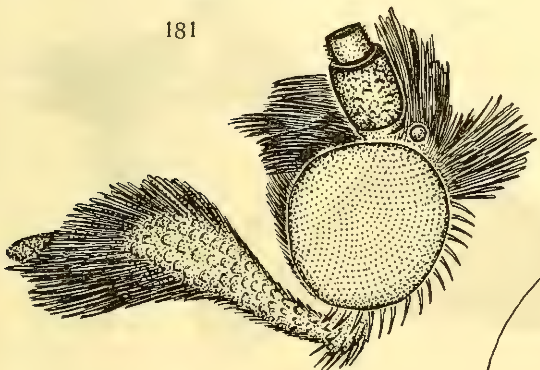
Weibliche Genitalien (Abb. 180, 183, 189—191). Papillae anales weichhäutig,

---

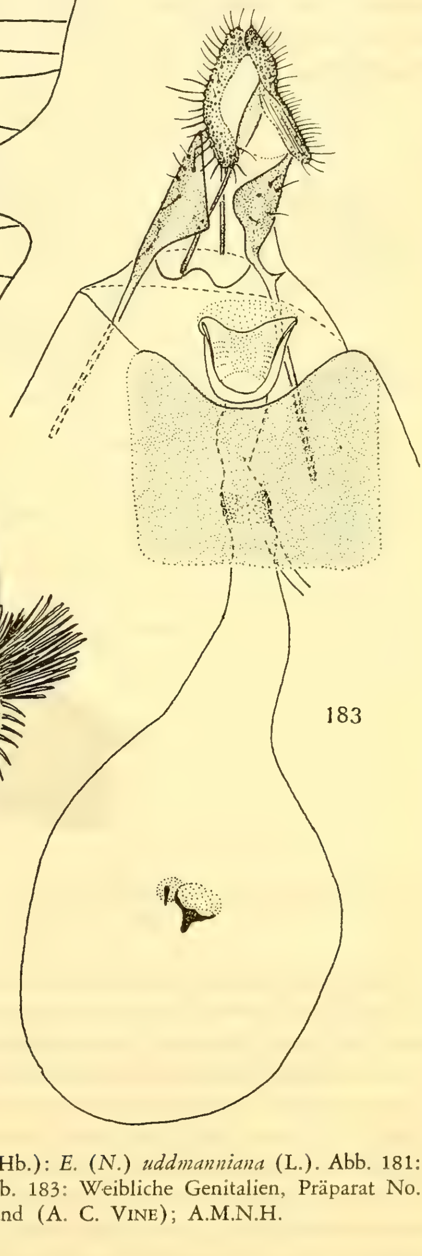
[1]) Manchmal (Untergattung *Notocelia* Hb.) ist der Dorsalrand des Männchens durch eine Rinne begleitet, die einen langen, von der Flügelbasis entspringenden Haarbüschel enthölt.



181



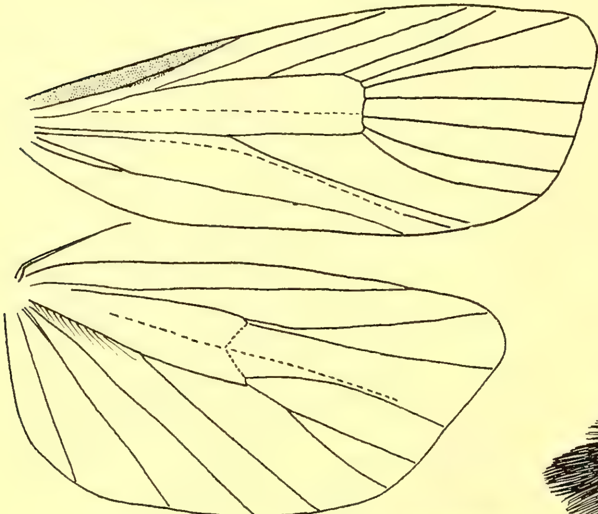
182



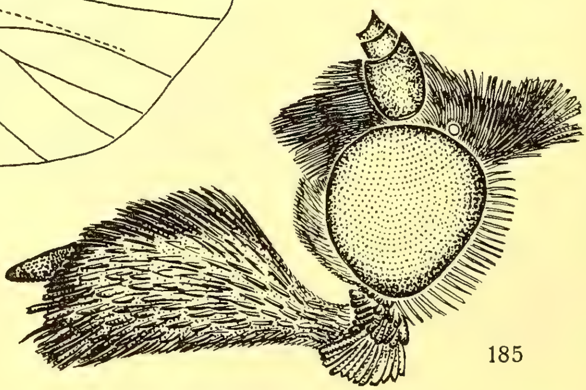
183

Gattung *Epiblema* Hb. (Untergattung *Notocelia* Hb.): *E.* (*N.*) *uddmanniana* (L.). Abb. 181: Männchen, Geäder. Abb. 182: Idem, Kopf. Abb. 183: Weibliche Genitalien, Präparat No. 785-Obr., Brighton, Sussex, England (A. C. Vine); A.M.N.H.

länglich, gewöhnlich mäßig breit. Apophyses posteriores länger als die Papillae anales und so lang oder leicht kürzer als die Apophyses anteriores. Ostium bursae liegt mehr oder weniger caudal von der Ventralplatte; Lamella postvaginalis rundlich oder etwas eckig, länglich oder fast so lang wie breit; Antrum höchstens rudimentär; Ductus bursae breit, meistens mäßig lang, öfters etwas sklerotisiert. Corpus bursae rundlich oder oval, am Fundus bisweilen schmäler; zwei meistens flache, kegelförmige Signa.



184



185

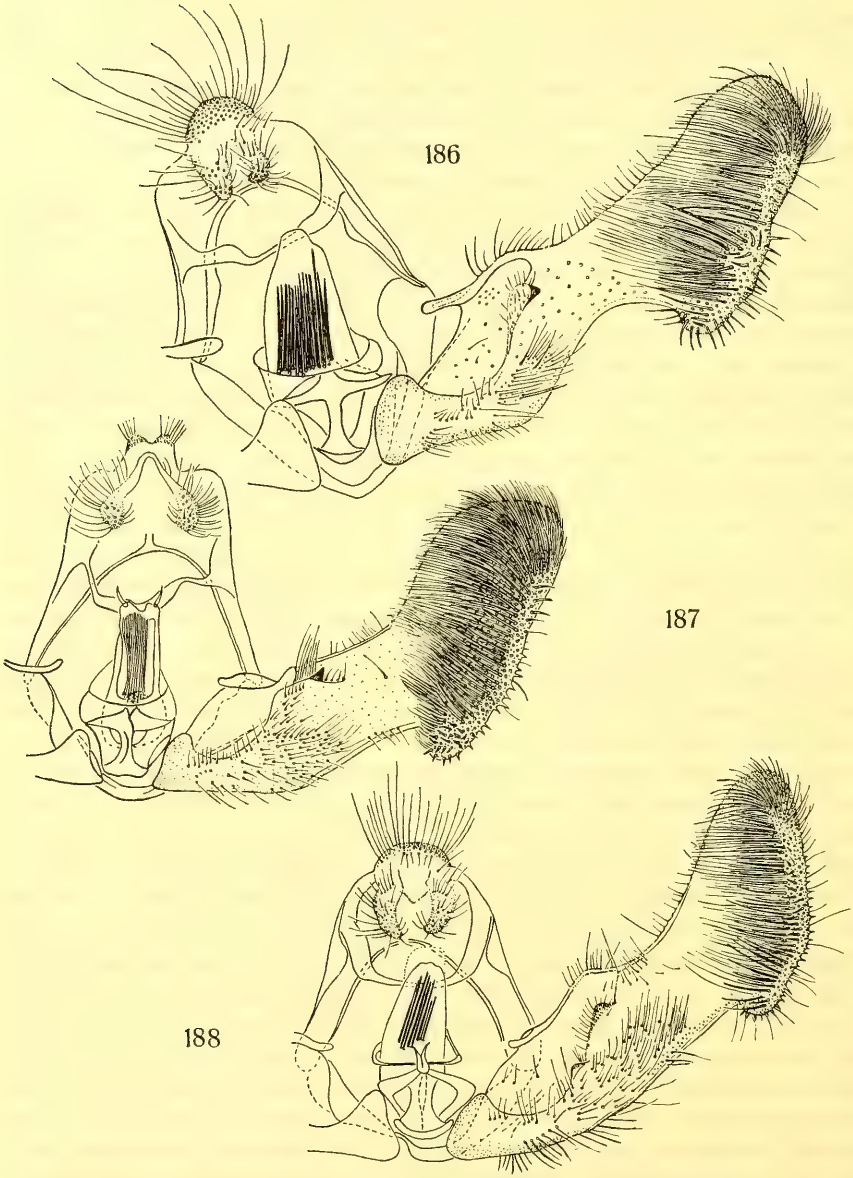
Gattung *Epiblema* Hb. (Untergattung *Cacochroea* Ld.): *E.* (*C.*) *grandaevana* (Z.), Männchen. Abb. 184: Geäder. Abb. 185: Kopf

Längere Zeit war *Epiblema* als eine umfangreiche und sehr heterogene Gruppe aufgefaßt, zu welcher die meisten Eucosmini-Arten mit einem Vorderflugelcostalumschlag beim Männchen zusammengezogen wurden. Dementsprechend enthielt diese Gattung in ihrem Bestand mehrere ihrem Gattungstypus phylogenetisch ganz fremde Arten (vgl. Staudinger & Rebel, 1901: 115—120, 262—263; Kennel, 1921: 547—621, 720), die später als *Eucosma* Hb., *Pelochrista* Ld. und andere eigene Gattungen abgesondert wurden. In der amerikanischen Literatur wurde der Gattungsname *Epiblema* durch Eucosma ersetzt und der Artbestand dieser Gattung faunengemäß geänert (Fernald, 1903 : 455—460), aber der allgemeine gemischte Charakter dieser Gruppe blieb unverändert. Pierce & Metcalfe (1922) waren anscheinend die ersten Autoren, welche *Epiblema* auf eine geringere Zahl der Arten

einschränkten und aus dieser Gattung eine natürliche Gruppe schufen. Später haben HEINRICH (1933: 136—155) für die nearktische Fauna und OBRAZTSOV (1946: 36—37) für die palaearktische die Gattung *Epiblema* von ihr fremden Elementen befreit und sie auf eine geringere Zahl der mit einander verwandten Arten beschränkt. Diese beiden Autoren haben in *Epiblema* solche Gruppen wie *Notocelia*, *Bardia* und *Cacochroea* einverleibt, die später von SWATSCHEK (1958) und HANNEMANN (1961) als eigene Gattungen behandelt wurden.

In ihrer Morphologie ist die Gattung *Epiblema* ziemlich einheitlich. Wenn ihre einzelnen Merkmale doch etwas variieren, so nicht stärker und fast in gleichen Richtungen wie in der Gattung *Eucosma*, wo sie näher erörtert sind. Von dieser letzteren Gattung unterscheidet sich *Epiblema* durch eine Reihe con Merkmalen, von welchen die meisten aus der Beschreibung der *Eucosma* in dieser Publikation zu ersehen sind. Im Genitalbau der *Epiblema*-Arten ist besonders charakteristisch das Vorhandensein eines Pulvinus an der Valva, welcher bei *Eucosma* fehlt. Dieser Pulvinus sitzt am Außenrand der Basalaushöhlung der Valva, ist mehr oder weniger stark sklerotisiert und erinnert an den Pulvinus der *Petrova*- und *Blastesthia*-Arten. In den weiblichen Genitalien unterscheidet sich *Epiblema* von *Eucosma* durch das Ostium bursae, welches bei *Epiblema* caudal von der Ventralplatte des 7. Abdominalsternits liegt und in diese nicht eingezogen ist. Die Genitalien beider Geschlechter der *Epiblema* zeigen meistens größere Artdifferenzen als bei *Eucosma*.

Larvalmorphologisch ist *Epiblema* noch ganz ungenügend erforscht. SWATSCHEK (1958) gibt die folgende Diagnose der Raupen der sieben von ihm untersuchten *Epiblema*-Arten: „Die Hakenkränze der Bauchfüße sind einrangig, die Stigmen des 2. Abdominalsegments größer als die Ansatzstelle der Borste III. Am 8. Abdominalsegment sind die Borsten II nicht weiter voneinander entfernt als die Borsten I, meist sogar näher beisammen, oder am Mesothorax befindet sich IIIa dorsocranial von III." Von diesen Arten trennt SWATSCHEK *grandaevana* in eine eigene Gattung *Cacochroea* ab, bei welcher die Hakenkränze der Bauchfüße wenigstens am Hinterrande zweirangig sind; alle Stigmen sind stark elliptisch ausgezogen, selbst am 2. Abdominalsegment größer als die Ansatzstelle der Borste III und der Nackenschild ist in der Mitte gegen den Kopf hin ausgezogen. Diese generische Absonderung der *grandaevana* scheint unbegründet zu sein, da imaginalmorphologisch zu *Cacochroea* noch *turbidana* gehört, die SWATSCHEK zu *Epiblema* zählt. Die beiden Arten stimmen in ihren imaginalmorphologischen Merkmalen überein; auch larvalmorphologisch sind sie bis auf kleinere Unterschiede sehr ähnlich. Zu diesen Unterschieden gehören: die Anordnung der Borsten I und II am 8. Abdominalsegment, die Größe und Form der Stigmen und die Reihenzahl der Haken auf den Bauchfüßen. Der Borstenunterschied ist gegebenenfalls taxonomisch nicht so wichtig, da eine ähnliche Borstenanordnung wie in *grandaevana* auch bei manchen anderen *Epiblema*-Raupen auftritt. Die taxonomische Bedeutung der Stigmengröße und -form ist bis jetzt überhaupt noch wenig geklärt, obwohl FRACKER (1915) ihre Veränderlichkeit in manchen anderen Lepidopteren-Gruppen in einen Zusammenhang mit der Artspezialisierung stellt. Was die Zahl der Hakenreihen auf den Bauchfüßen betrifft, so berichten GERASIMOV (1952: 52) und MacKAY (1963: 1333) über ihre Anpassungsnatur, die nicht unbedingt phylogenetisch ist, aber von der Lebensweise der Raupen innerhalb der Pflanzen oder an ihrer Ober-

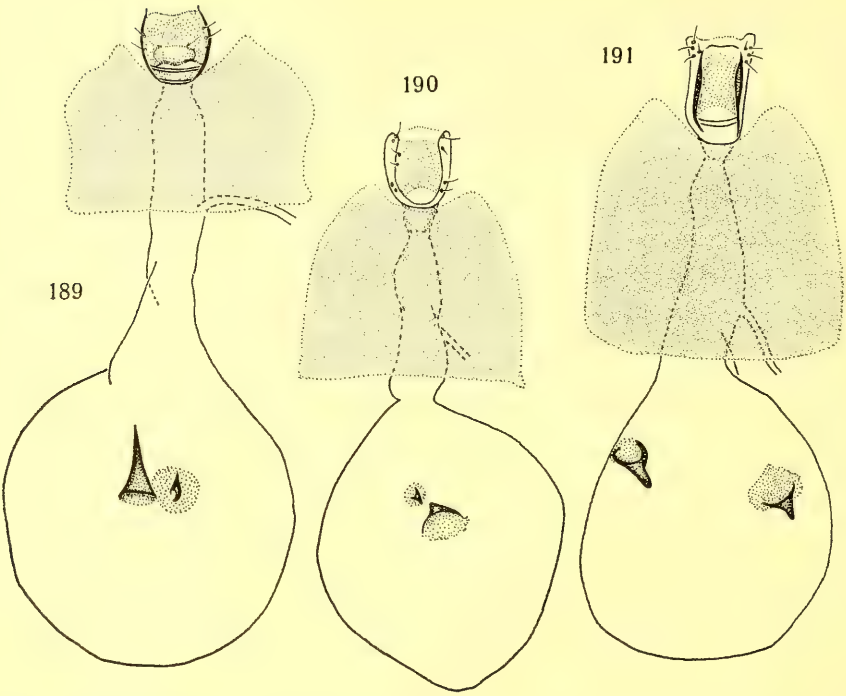


Gattung *Epiblema* Hb.: Männliche Genitalien. Abb. 186: *E.* (*Epiblema*) *foenella* (L.), Präparat No. 792-Obr., Brighton, Sussex, England (A. C. VINE). Abb. 187: *E.* (*Notocelia*) *uddmanniana* (L.), Präparat No. 784-Obr., Bromley, England, 26.VI.1931 (S. N. VINE). Abb. 188: *E.* (*Cacochroea*) *grandaevana* (Z.), Präparat No. 794-Obr., England (MORLEY). Alle Präparate im A.M.N.H.

fläche abhängen kann. Deshalb hat auch *grandaevana*, deren Raupe a n der Wurzeloberfläche nagt, zweirangige Hakenkränze der Bauchfüße, während sie bei der i n n e r h a l b der Wurzel lebenden *turbidana*-Raupe einrangig sind. Demgemäß erscheint auch eine generische Abtrennung der *Notocelia*- und *Pardia*-Arten auf Grund einer Hakenzweirangigkeit auf den Bauchfüßen kaum berechtigt zu sein. Die Raupen der hierher gehörenden Arten leben zwischen den versponnenen Blättern und Trieben.

Bei der Untersuchung der nordamerikanischen *Epiblema*-Raupen kam MacKay (1959) zum Ergebnis, daß diese zwei morphologisch recht verschiedene Gruppen bilden. Die eine von ihnen schließt sich der Gattung *Sonia* Heinr. sehr dicht an und die Verfasserin ist geneigt, dieser Gruppe noch manche andere *Epiblema*-Arten zuzurechnen, die genitaliter ähnlich aussehen, aber larvalmorphologisch noch nicht untersucht sind. Die zweite *Epiblema*-Gruppe besteht aus typischen Vertretern dieser Gattung, die, ähnlich wie die *Eucosma*-Raupen, innerhalb der Pflanzen bohren und öfters Gallen bilden. Diese *Epiblema*-Arten unterscheiden sich von „*Eucosma*"-Gruppen 2 und 3 und „*Thiodia*"-Gruppen 3 und 4 (s. die Beschreibung der Gattung *Eucosma*) durch eine sehr kurze Spindel, deren Länge-Breite-Proportion hier nur 3—5,5 zu 1 ist und bei den genannten *Eucosma*-Raupen 6—10 zu 1 erreicht. Dieses Merkmal trennt die *Epiblema*-Raupen auch von solchen der Gattung *Pelochrista* Ld. ab. Dagegen reicht es für die Absonderung der Raupen des „*Eucosma*"-Gruppe 1 und „*Thiodia*"-Gruppen 1 und 2 von denen der *Epiblema* nicht aus, da bei allen aufgezählten Raupen die Spindel kurz ist. Trotzdem zeichnet sich die „*Thiodia*"-Gruppe 2 durch eine stumpfe, öfters etwas erweiterte oder leicht eingeschnittene Spindelspitze aus, die bei den *Epiblema*-Raupen immer abgerundet und niemals eingeschnitten ist. Von den übrigen zweien *Eucosma*-Gruppen („*Eucosma*" 1 und „*Thiodia*" 1) unterscheiden sich die *Epiblema*-Raupen durch einen Komplex von Merkmalen, die in den erwähnten *Eucosma*-Gruppen in einer ähnlichen Kombination nicht auftreten. Die Borstenwarzen sind bei *Epiblema* meistens groß (auf dem 1. bis 8. Abdominalsegment sitzt die Borste IIIa auf einer gemeinsamen Warze mit III) und die Warzen II am 8. Abdominalsegment sind stets nicht weniger als auf deren Diameter auseinander gestellt. Öfters sind die Ocellen weit auseinander gestellt (3. und 4. manchmal näher zueinander als die übrigen) und gewöhnlich sind sie flach und von unregelmäßiger Form. Die dorsale Kopfansicht zeigt eine regelmäßige rundliche Ocellenanordnung, aber der Scheitelausschnitt ist gewöhnlich eher stumpfwinklig als recht- oder scharfwinklig. Die Labialpalpen haben ein deutlich stämmiges Basalsegment. Die Borsten IV und V befinden sich am 2. bis 8. Abdominalsegment mehr oder weniger gerade ventral vom Stigma; die Borste III steht am 8. Abdominalsegment in gleicher Höhe mit dem Stigma oder etwas ventrocranial (seltener dorsocranial) von ihm. Die Häkchen der Bauchfüße sind einrangig oder nur unregelmäßig zweirangig, niemals ausgesprochen zweirangig.

Diese komplizierte Charakteristik ist für die Unterscheidung der nordamerikanischen *Epiblema*- und *Eucosma*-Raupen notwendig und kann vielleicht auch bei der Bestimmung der palaearktischen Arten behilflich sein. Vorläufig, da nur eine ganz geringe Zahl der letzteren untersucht ist, genügen für diese die folgenden Merkmale. Die *Epiblema*-Raupen unterscheiden sich von solchen der *Eucosma* ent-



Gattung *Epiblema* Hb. (Untergattung *Epiblema* Hb.): Weibliche Genitalien. Abb. 189: *E.* (*E.*) *farfarae* (Fletch.), Präparat No. 799-Obr., Glatz, Schlesien; A.M.N.H. Abb. 190: *E.* (*E.*) *scutulana* (Schiff.), Präparat No. 798-Obr., England (A. FORD); A.M.N.H. Abb. 191: *E.* (*E.*) *cretana* Osth., Holotypus

weder durch den Abstand zwischen den Borsten I am 8. Abdominalsegment, der nicht kleiner als der zwischen den Borsten II ist (die letzteren stehen jedoch meist näher zueinander), oder durch die am Mesothorax dorsocranial von III stehende Borste IIIa. Oder der Unterschied liegt darin, daß bei *Epiblema* die Gruppe VII am 7. Abdominalsegment aus zwei Borsten besteht, oder daß auf der Ventralseite der Nachschieber nur drei Borsten vorhanden sind, jede auf einer eigenen Warze. Von *Pelochrista* unterscheiden sich die *Epiblema*-Raupen dadurch, daß bei ihnen die Borste III am 8. Abdominalsegment ventrocranial vom Stigma oder mit diesem in gleicher Höhe steht. Kaum ist es notwendig zu sagen, daß diese Unterschiede schwerlich auf die Raupen aller Arten der genannten Gattungen passen werden. Bereits jetzt zeigt ein Vergleich der Ergebnisse über die Larvalmorphologie der palaearktischen Arten mit solchen über die nordamerikanischen Vertreter derselben Gattungen wie wenig diese miteinander übereinstimmen und wie weit wir noch von einer allgemeinen Vorstellung über die taxonomische Bedeutung einzelner Merkmale der Raupen der *Epiblema, Eucosma, Pelochrista* und der verwandten Gattungen stehen.

Auf Grund der Genitalien kann *Epiblema* in drei Untergattungen aufgeteilt werden.

1. Untergattung *Epiblema* Hb. s. str. (Typus subgeneris: *Phalaena Tinea foenella* L., 1758). Valva mit einem einzigen, sich in subcostaler Hälfte des Außenrandes der Basalaushöhlung befindenden Pulvinus. Alle Cornuti sind abwerfbar.

2. Untergattung *Cacochroea* Ld., status nov. (Typus subgeneris: *Paedisca grandaevana* Z., 1846). Außer einem Pulvinus wie in *Epiblema,* befindet sich ein zweiter Pulvinus in der unteren Hälfte des Außenrandes der Basalaushöhlung der Valva. Cornuti wie in *Epiblema.*

3. Untergattung *Notocelia* Hb. (Typus subgeneris: *Phalaena Tortrix uddmanniana* L., 1758). Pulvinus wie in *Epiblema.* Außer abwerfbarer Cornuti, befinden sich noch zwei weitere fixierte Cornuti im Außenteil der Vesica.

KATALOG DER PALAEARKTISCHEN *EPIBLEMA*-ARTEN

Sg. Epiblema Hb., 1825

E. (E.) banghaasi Kenn.* (1)
banghaasi KENNEL, 1901, Iris 13 (1900): 291 (*Epiblema*). — STAUDINGER & REBEL, 1901: 263, No. 2154*ter*; KENNEL, 1921: 616, t. 23 fig. 5 (♂); diese Arbeit: Taf. 17 Fig. 1 (♂-Genitalien). — Südostsibirien (Sutschan).

E. (E.) foenella (L.)* (2)
foenella LINNÉ, 1758, Syst. Nat. ed. 10: 536 (*Phalaena Tinea*); *hochenwartiana* SCOPOLI, 1772, Ann. Hist. Nat. 5: 117 (*Phalaena*); *scopoliana* SCHIFFERMILLER & DENIS, 1776, Syst. Verz. Schm. Wien. Geg.: 129 (*Phalaena Tortrix*); *pflugiana* FABRICIUS, 1787, Mant. Ins. 2: 227 (*Pyralis*); *tibialana* HÜBNER, 1793, Samml. auserl. Vög. u. Schm.: 12, t. 64 (*Phalaena*); *foenana* HAWORTH, 1811, Lep. Brit.: 439 (*Tortrix*); *foeneana* TREITSCHKE, 1830, Schm. Eur. 8: 196 (*Paedisca*); *faeneana* GUENÉE, 1845, Ann. Soc. Ent. France (2) 3: 176 (*Ephippiphora*); *fönella*: ZELLER, 1853, Stett. Ent. Ztg. 14: 208 (*Phalaena); SYNON. NOV.: *sinicana* WALKER, 1863, List Spec. Lepid. Ins. 28: 347 (*Sciaphila*); *foenellum*: MEYER, 1909, KRANCHERS Ent. Jahrb. 18: 144 (*Epiblema*); *focnella* (err. typogr.): ESCHERICH, 1931, Forstins. Mitteleur. 3: 341, fig. 292 (*Epiblema*). — STAUDINGER & REBEL, 1901: 120, No. 2154; KENNEL, 1921: 583, t. 22 fig. 16 (♂); PIERCE & METCALFE, 1922: 70, t. 23 (♂♀-Genitalien); BENANDER, 1950: 132, t. 8 fig. 14 (Vorderflügel); ISSIKI, 1957: 61, t. 9 fig. 282 (♂); SWATSCHEK, 1958: 146, fig. 162 (Larvalmorphologie); OKANO, 1959: 260; HANNEMANN, 1961: 138, fig. 276—276b (Kopf, Geäder, ♂-Genitalien); diese Arbeit: Abb. 178—180, 186 (Kopf, Geäder, ♂♀-Genitalien). — Ganze Palaearktische Region; Yünnan; Indien.

f. albrechtella Meyer
albrechtella MEYER, 1911, Soc. Ent. 25: 95 (*Epiblema*).

f. accentana Car.
accentana CARADJA, 1916, Iris 30: 67 (*Epiblema*).

f. interrogationana Don.
interrogationana DONOVAN, 1793, Nat. Hist. Brit. Ins. 2: 75, t. 65 fig. 1 (*Phalaena*); SYNON. NOV.: *acclivella* UFFELN, 1912, Zschr. wiss. Ins.biol. 8: 136 (*Epiblema*); SYNON. NOV.: *confluens* WÖRZ, 1953, Jahr.hefte Ver. Vaterl. Naturk. Württ. 108: 99 (*Epiblema*); *foenella* (non L.): MATSUMURA, 1931, 6000 Illustr. Ins. Jap.: 1069, fig. (*Epiblema*). — ISSIKI, 1957: t. 9 fig. 281 (♀); OKANO, 1959: t. 174 fig. 30 (♂).

f. clavigerana Wkr. status nov.
clavigerana WALKER, 1863, List Specim. Lepid. Ins. 28: 389 (*Grapholita*); SYNON. NOV.: *effusana* KENNEL, 1912, Zschr. wiss. Ins.biol. 8: 134 (*Epiblema*); SYNON. NOV.: *circumflexana* CARADJA, 1916, Iris 30: 67 (*Epiblema*).

f. separana Krul.

separana KRULIKOVSKIJ, 1909, Mater. poznan. fauny i flory Rossijsk. Imper. 9: 215 (*Epiblema*); SYNON. NOV.: *divisa* WÖRZ, 1953, Jahr.hefte Ver. Vaterl. Naturk. Württ. 108: 99 (*Epiblema*); SYNON. NOV.: *interrupta* WÖRZ, 1953, ibid.: 99 (*Epiblema*).

f. unicolorana Klem.

unicolorana KLEMENSIEWICZ, 1900, Spraw. Kom. fizyogr. Akad. Umietn. Kraków 34: 187 (*Epiblema*); SYNON. NOV.: *unicolor* KENNEL, 1912, Zschr. wiss. Ins.biol. 8: 134 (*Epiblema*); SYNON. NOV.: *fuscata* WÖRZ, 1953, Jahr.hefte Ver. Vaterl. Naturk. Württ. 108: 99 (*Epiblema*).

E. (E.) inconspicua (Wlsm.)* (3)

inconspicua WALSINGHAM, 1900, Ann. & Mag. Nat. Hist. (7) 6: 340 (*Eucosma*). — ISSIKI, 1957: 61, t. 9 fig. 279, 280 (♂ ♀); diese Arbeit: Taf. 17 Fig. 2, 3, Taf. 18 Fig. 1—3 (Falter, ♂ ♀-Genitalien). — Japan.

E. (E.) baligrodana Toll*

baligrodana TOLL, 1958, Ann. Zool. Polsk. Akad. Nauk 17: 74, fig. 9 (Vorderflügel), t. 3 fig. 12 (♂-Genitalien) (*Epiblema*). — Polen (Waldkarpaten).

E. (E.) denigratana Kenn.* (4)

denigratana KENNEL, 1901, Iris 13 (1900): 281 (*Epiblema*). — STAUDINGER & REBEL, 1901: 263, No. 2086*bis*; KENNEL, 1921: 565, t. 21 fig. 38 (♂); ISSIKI, 1957: 61, t. 9 fig. 284 (♀); diese Arbeit: Taf. 18 Fig. 4 (♂-Genitalien). — Südostsibirien (Sutschan); Japan.

E. (E.) trigeminana (Stph.)*

trigeminana STEPHENS, [1829, Syst. Cat. Brit. Ins. 2: 174, No. 6908; nom. nud.], 1834, Illustr. Brit. Ent., Haust. 4: 94, t. 37 fig. 3 (*Spilonota, Epinotia*); *argyrana* (non Hb.): STEPHENS, 1834, op. cit.: 95 (*Spilonota, Epinotia*); *brunnichiana* (non Fröl.): DUPONCHEL, 1835, Hist. Nat. Lépid. France 9: t. 53 fig. 9 (non bin.); 1836, op. cit.: 358 (*Paedisca*); *poecilana* GUENÉE, 1845, Ann. Soc. Ent. France (2) 3: 177 (*Ephippiphora*); *ravulana* HERRICH-SCHÄFFER, 1851, Syst. Bearb. Schm. Eur. 4: 241 (*Paedisca*) [1847, Tortr.: t. 20 fig. 143; non bin.]; *costipunctana* (non Hw.): BANKES, 1907, Ent. Mo. Mag. 43: 181 (*Pammene*); *trigeminanum*: MEYER, 1909, KRANCHERS Ent. Jahrb. 18: 147 (*Epiblema*). — STAUDINGER & REBEL, 1901: 117, No. 2103 (part.); KENNEL, 1921: 579, t. 22 fig. 7 (♂); PIERCE & METCALFE, 1922: 69, t. 23 (♂ ♀-Genitalien); BENANDER, 1950: 132, fig. 11*v* (♂-Genitalien), t. 8 fig. 9 (Vorderflügel); OBRAZTSOV, 1952*b*: 125, fig. 2*d* (♂-Genitalien); SWATSCHEK, 1958: 148, fig. 164 (Larvalmorphologie); HANNEMANN, 1961: 141, fig. 284 (♂-Genitalien), t. 12 fig. 1 (Falter). — Britannien; Schweden; Belgien; Frankreich; Süd- und Südwestdeutschland; Schweiz; Österreich; Balkanhalbinsel; Ukraine; Ostrußland.

E. (E.) farfarae (Fletch.)* (5)

?sticticana FABRICIUS, 1794, Ent. Syst. 3 (2): 270 (*Pyralis*); *?similana* (non Schiff.): LASPEYRES, 1805, ILLIGERS Mag. Ins. Kunde 4: 15 (*Tortrix*); *rusticana* (non F.): HAWORTH, 1811, Lep. Brit.: 442 (*Tortrix*); *jacquiniana* (non Schiff.): CHARPENTIER, 1821, Zinsler etc.: 93 (*Tortrix*); *profundana* (non F.): [HÜBNER, 1796—1799, Samml. eur. Schm., Tortr.: t. 4 fig. 21; non bin.] ILLIGER, 1801, Syst. Verz. Schm. Wien. Geg. 2: 69 (*Phalaena Tortrix*); *brunichiana* HÜBNER, 1825, Verz. bek. Schm.: 376 (*Epiblema*); *brunnichiana* (non L.): FRÖLICH, 1828, Enum. Tortr. Würt.: 46 (*Tortrix*); *quadrana* (non Hb.): STEPHENS, 1834, Illustr. Brit. Ent., Haust. 4: 93 (*Spilonota, Epinotia*); *?quadratana* EVERSMANN, 1844, Fauna Lepid. Volgo-Ural.: 513 (*Grapholitha*); *scutulana* (part.): GUENÉE, 1845, Ann. Soc. Ent. France (2) 3: 176 (*Ephippiphora*); *brunnichianum*: MEYER, 1909, KRANCHERS Ent. Jahrb. 18: 147 (*Epiblema*); *simploniana* (err. det.): REBEL, 1911, Jahresber. Wien. Ent. Ver. 21 (1910): 109 (*Epiblema*); *farfarae* FLET-

cher, 1938, Ent. Rec. 50: 25 (*Eucosma*). — Staudinger & Rebel, 1901: 120, No. 2150; Kennel, 1921: 575, t. 22 fig. 3 (♂); Pierce & Metcalfe, 1922: 70, t. 23 (♂ ♀-Genitalien) (in allen drei Publikationen: als *brunnichiana*); Benander, 1950: 131, fig. 12*f* (♂-Genitalien), t. 8 fig. 10 (Vorderflügel); Obraztsov, 1952*c*: 328, fig. 4 (♂-Genitalien); Swatschek, 1958: 147 (Larvalmorphologie); Hannemann, 1961: 140, fig. 277 (♂-Genitalien), t. 11 fig. 14 (Falter); diese Arbeit: Abb. 189 (♀-Genitalien). — Ganz Europa; Britannien; Kleinasien; Südostsibirien.

f. ochreana Hauder
ochreana Hauder, 1918, Ent. Zschr. Frankfurt/M. 31: 102 (*Epiblema*).

f. **melstediana** Larsen
melstediana Larsen, 1927, Ent. Medd. 17: 3, t. 1 fig. 6, 7 (*Epiblema*). — Benander, 1950: 132.

E. (E.) **obscurana** (H.S.)* (6)
obscurana Herrich-Schäffer, 1851, Syst. Bearb. Schm. Eur. 4: 243 (*Paedisca*) [1848, Tortr.: t. 43 fig. 307; non bin.]; *inulivora* Meyrick, 1932, Exot. Micr. 4: 224 (*Eucosma*). — Staudinger & Rebel, 1901: 120, No. 2147; Kennel, 1921: 580, t. 22 fig. 9 (♂); Swatschek, 1958: 147 (Larvalmorphologie); Hannemann, 1961: 142, fig. 289 (♂-Genitalien), t. 11 fig. 19 (Falter). — Süd- und Südwestdeutschland; Österreich; Tschechoslowakei; Südtirol; Piemont; Südfrankreich; Balkanhalbinsel.

E. (E.) **graphana** (Tr.)*
graphana Treitschke, 1835, Schm. Eur. 10 (3): 96, 254 (*Paedisca*); *pierretana* Duponchel, 1836, Hist. Nat. Lép. France 9: 566, t. 266 fig. 3 (*Grapholitha*); *graphanum*: Meyer, 1909, Kranchers Ent. Jahrb. 18: 146 (*Epiblema*). — Staudinger & Rebel, 1901: 117, No. 2105; Kennel, 1921: 593, t. 22 fig. 34 (♀); Hannemann, 1961: 140, fig. 279 (♂-Genitalien), t. 15 fig. 15 (Falter). — Europa (nicht in England und Iberien); Kleinasien; Südwest- und Zentralasien.

E. (E.) **confusana** (H.S.)*
confusana Herrich-Schäffer, 1856, Syst. Bearb. Schm. Eur. 6 (Nachtr.): 161 (*Paedisca*); *hepaticana* (part.): Lederer, 1859, Wien. Ent. Mschr. 3: 332 (*Paedisca*); ?*pietruskii* Nowicki, 1860, Enum. Lepid. Halic.: 143 (*Paedisca*); *trigeminana* (part.): Rebel, 1901, Stgr.-Rbl. Cat. Lep. Pal. Faun. 2: 117, No. 2103 (*Epiblema*). — Kennel, 1921: t. 22 fig. 8 (als *trigeminana*); Obraztsov, 1952*b*: 125, fig. 2*c* (♂-Genitalien), Hannemann, 1961: 141, fig. 285 (♂-Genitalien), t. 21 fig. 10 (Falter). — Südwestdeutschland; ?Österreich; ?Bulgarien; Ukraine; Ostrußland; ?Ostbaltikum.

E. (E.) **fuchsiana** (Rössl.)*
fuchsiana Rössler, 1877, Stett. Ent. Ztg. 38: 75 (*Grapholitha*). — Staudinger & Rebel, 1901: 119, No. 2140; Kennel, 1921: 598, t. 22 fig. 44 (♂); Hannemann, 1961: 140, fig. 280 (♂-Genitalien), t. 15 fig. 12 (Falter). — Westdeutschland; Südfrankreich; Ostrußland; Zentralasien; Westchina.

E. (E.) **sarmatana** (Chr.)*
sarmatana Christoph, 1872, Horae Soc. Ent. Ross. 9: 16, t. 1 fig. 13 (*Grapholitha*). — Staudinger & Rebel, 1901: 115, No. 2064; Kennel, 1921: 597, t. 22 fig. 43 (♂). — Ostrußland; Kasachstan; Transili- und Dschungar-Alatau.

E. (E.) **asseclana** (Hb.)* (7)
similana Schiffermiller & Denis, 1776, Syst. Verz. Schm. Wien. Geg.: 131 (*Phalaena Tortrix*); *fluidana* Schiffermiller & Denis, 1776, op. cit.: 81 (*Phalaena Tortrix*); *wahlbomiana* (non L.): Laspeyres, 1805, Illigers Mag. Ins. Kunde 4: 13 (*Tortrix*); *scutulana* (non Schiff.): Charpentier, 1821, Zinsler etc.: 86 (*Tortrix*); *asseclana*

HÜBNER, [1796—1799, Samml. eur. Schm., Tortr.: t. 4 fig. 19; non bin.], 1822, Syst.-alph. Verz.: 58 (*Olethreutes*); *stroemiana* (non F.): FRÖLICH, 1828, Enum. Tortr. Würt.: 44 (*Tortrix*); *profundana* (part.) TREITSCHKE, 1829, Schm. Eur. 7: 233 (*Thirates*). — STAUDINGER & REBEL, 1901: 119, No. 2139; KENNEL, 1921: 585, t. 22 fig. 19 (♂); HANNEMANN, 1961: 140, fig. 278 (♂-Genitalien), t. 11 fig. 16 (Falter) (bei dem letzterwähnten Autor: als *similana*). — Mittel- und Südeuropa (nicht in Iberien); Rußland; Nordukraine; ?Südwestchina.

E. (E.) scutulana (Schiff.)*

scutulana SCHIFFERMILLER & DENIS, 1776, Syst. Verz. Schm. Wien. Geg.: 131 (*Phalaena Tortrix*); *fluidana* (non Schiff.): SCHRANK, 1802, Fauna Boica 2: 12, 81 (*Tortrix*); *pflugiana* HAWORTH, 1811, Lep. Brit.: 442 (*Tortrix*; nom. praeocc.); *stictana* var. *α* HAWORTH, 1811: l.c. (*Tortrix*); *profundana* (part.): FRÖLICH, 1828, Enum. Tortr. Würt.: 46 (*Tortrix*); *luctuosana* (part.): DUPONCHEL, 1836, Hist. Nat. Lépid. France 9: 326 (*Ephippiphora*); *novana* GUENÉE, 1845, Ann. Soc. Ent. France (2) 3: 176 (*Ephippiphora*); *pflugianum*: MEYER, 1909, KRANCHERS Ent. Jahrb. 18: 145 (*Epiblema*); *pfugiana* (err. typogr.): WU, 1938, Cat. Ins. Sin.: 56 (*Eucosma*). — STAUDINGER & REBEL, 1901: 119, No. 2143 (als *pflugiana*) und No. 2144 (als *luctuosana*); KENNEL, 1907: 282, t. 86 fig. 23; 1921: 578, t. 22 fig. 4, 5; PIERCE & METCALFE, 1922: 68, 69, t. 23 (♂ ♀-Genitalien); BENANDER, 1950: 131, fig. 12*b* (♂-Genitalien), t. 8 fig. 8 (Vorderflügel) (bei allen obigen Autoren: als *pflugiana*); OBRAZTSOV, 1952*c*: 323—330 (systematisch-nomenklatorische Studien); SWATSCHEK, 1958: 147 (Larvalmorphologie); HANNEMANN, 1961: 141, fig. 283 (♂-Genitalien), t. 15 fig. 22 (Falter); diese Arbeit: Abb. 190 (♀-Genitalien). — Ganze Palaearktische Region (?nicht in Nordwestafrika).

f. alsaticana Peyer.

alsaticana PEYERIMHOFF, 1872, Ann. Soc. Ent. France (5) 2: 10, t. 5 fig. 4 (*Grapholitha*); *pflugiana* (part.): KENNEL, 1907, SPULERS Schm. Eur. 2: 282 (*Epiblema*). — STAUDINGER & REBEL, 1901: 119, No. 2143*a*; KENNEL, 1921: 572, t. 22 fig. 6 (♀); OBRAZTSOV, 1952*c*: 328, 329, fig. 1 (♂-Genitalien).

f. ♂ luctuosana Dup.

sticticana (non F.): STEPHENS, 1829, Syst. Cat. Brit. Ins. 2: 174, No. 6909 (*Spilonota*); *luctuosana* DUPONCHEL, 1836, Hist. Nat. Lép. France 9: 326, t. 252 fig. 4 (*Ephippiphora*); *scutulana* (part.): FISCHER V. RÖSLERSTAMM, 1840, Abb. Bericht. Ergänz. Schm.kunde: 176, t. 64 fig. c, g (*Paedisca*); *tetragonana* (part.): WOCKE, 1871, Stgr.-Wck. Cat. Lep. Eur. Faun.: 255, No. 1103 (*Grapholitha, Paedisca*); *luctuosanum*: MEYER, 1909, KRANCHERS Ent. Jahrb. 18: 148 (*Epiblema*). — STAUDINGER & REBEL, 1901: 119, No. 2144; BENANDER, 1950: 131, fig. 12*c* (♂-Genitalien); OBRAZTSOV, 1952*c*: 328, 329, fig. 2 (♂-Genitalien).

f. cirsiana Z.

?*stictana* var. *β* HAWORTH, 1811, Lep. Brit.: 442 (*Tortrix*); *stictana* (non F.): WOOD, 1839, Ind. Ent.: 137, t. 31 fig. 906 (*Spilonota, Halonota*); *scutulana* (part.): FISCHER V. RÖSLERSTAMM, 1840, Abb. Bericht. Ergänz. Schm.kunde: 176, t. 64 fig. b (*Paedisca*); *cirsiana* ZELLER, 1843, Stett. Ent. Ztg. 4: 150 (*Tortrix, Paedisca*); *mortuana* (Gn. in litt.) DOUBLEDAY, 1850, Synon. list Brit. Lepid.: 25 (*Ephippiphora*); *luctuosana* (part.): RAGONOT, 1894, Ann. Soc. Ent. France, 63: 213 (*Grapholitha*); *circiana* (lapsus): PIERCE & METCALFE, 1922: 68, 69, t. 22 (♂-Genitalien) (*Epiblema*). — STAUDINGER & REBEL, 1901: 119, No. 2144 (part.; als *luctuosana*); OBRAZTSOV, 1952*c*: 328, 329, fig. 3 (♂-Genitalien).

E. (E.) cretana Osth. (8)*

luctuosana (non Dup.) REBEL, 1902, Berl. Ent. Zschr. 47: 106 (*Epiblema*); *pflugiana* (non Hw.): REBEL, 1906, ibid. 50 (1905): 307 (*Epiblema*); *cretana* OSTHELDER, 1941, Mitt. Münchn. Ent. Ges. 31: 369 (*Epiblema*). — OBRAZTSOV, 1952*c*: 328, 330; diese Arbeit: Abb. 191 (♀-Genitalien), Taf. 20 Fig. 1 (Falter). — Kreta; Griechenland.

E. (E.) cnicicolana (Z.)*
cnicicolana ZELLER, 1847, Isis: 724 (*Paedisca*); *littoralana* PIERCE & METCALFE, 1915, Ent. Mo. Mag. 51: 327 (*Halonota*). — STAUDINGER & REBEL, 1901: 120, No. 2149; KENNEL, 1921: 577, t. 22 fig. 13 (♀); PIERCE & METCALFE, 1922: 69, t. 23 (♂ ♀-Genitalien; als *cnicicolana* und *littoralana*). — England; südl. Mitteleuropa; Ungarn; Balkanhalbinsel; Sizilien; Südpolen.

E. (E.) pentagonana Kenn.
pentagonana KENNEL, 1901, Iris 13 (1900): 289 (*Epiblema*). — STAUDINGER & REBEL, 1901: 563, No. 2135*bis*; KENNEL, 1921: 582, t. 22 fig. 14 (♀). — Ussuri.

E. (E.) angulatana Kenn.* (9)
angulatana KENNEL, 1901, Iris 13 (1900): 288 (*Epiblema*). STAUDINGER & REBEL, 1901: 263, No. 2154*bis*; KENNEL, 1921: 583, t. 22 fig. 15 (♂); diese Arbeit: Taf. 19 Fig. 1 (♂-Genitalien). — Südussuri (Sutschan).

E. (E.) pryerana (Wlsm.)* (10)
pryerana WALSINGHAM, 1900, Ann. & Mag. N. H. (7) 6: 338 (*Eucosma*). — ISSIKI, 1957: 61, t. 9 fig. 283 (♂); OKANO, 1959: 260, t. 174 fig. 31 (♀); diese Arbeit: Taf. 19 Fig. 2, Taf. 20 Fig. 2 (♂ ♀-Genitalien). — Japan.

E. (E.) hepaticana (Tr.)*
similana (part.): SCHIFFERMILLER & DENIS, 1776, Syst. Verz. Schm. Wien. Geg.: 131 (*Phalaena Tortrix*); *hepaticana* TREITSCHKE, 1835, Schm. Eur. 10 (3): 97, 254 (*Paedisca*); *hepaticanum*: MEYER, 1909, KRANCHERS Ent. Jahrb. 18: 147 (*Epiblema*). — STAUDINGER & REBEL, 1901: 117, No. 2099; KENNEL, 1921: 591, t. 22 fig. 31 (♂); OBRAZTSOV, 1952*c*: 124, fig. 2*b* (♂-Genitalien); HANNEMANN, 1961: 140, fig. 281 (♂-Genitalien), t. 15 fig. 17 (Falter). — Mittel- und Südeuropa; Südpolen; Nordwest- und Ostrußland; Kleinasien; Südwestasien; Dschungar-Alatau; ?Nordchina.

f. tristana Hauder
tristana HAUDER, [1919, Zschr. Österr. Ent. Ver. 4: 59; nom. nud.], 1924, Jahresber. Oberösterr. Mus. Ver. 80: 278 (*Epiblema*).

?ssp. senecionana Stgr.
senecionana STAUDINGER, 1870, Horae Soc. Ent. Ross. 7: 222 (*Grapholitha*). — STAUDINGER & REBEL, 1901: 117, No. 2099*a*; KENNEL, 1921: 591. — Griechenland; Dalmatien; ?West-Kopet-Dag.

E. (E.) chrétieni Obr.*
chrétieni OBRAZTSOV, 1952, Zschr. Wien. Ent. Ges. 37: 123, fig. 2*a* (♂-Genitalien) (*Epiblema*). — HANNEMANN, 1961: 142, fig. 290 (♂-Genitalien). — Hautes Alpes.

E. (E.) mendiculana (Tr.)*
mendiculana TREITSCHKE, 1835, Schm. Eur. 10 (3): 87 (*Sciaphila*). — STAUDINGER & REBEL, 1901: 119, No. 2141; KENNEL, 1921: 588, t. 22 fig. 26 (♂); HANNEMANN, 1961: 141, fig. 282 (♂-Genitalien), t. 11 fig. 21 (Falter). — Österreich; Ungarn; Schweiz; Albanien.

E. (E.) macrorris (Wlsm.) comb. nova* (11)
macrorris WALSINGHAM, 1900, Ann. & Mag. N. H. (7) 6: 339 (*?Eucosma*). — Diese Arbeit: Taf. 20 Fig. 3, 4 (Falter, ♀-Genitalien). — Japan.

E. (E.) gammana (Mn.) comb. nova*
gammana MANN, 1866, Verh. zool.-bot. Ges. Wien 16: 347, t. 1 fig. 2 (*Grapholitha*). — STAUDINGER & REBEL, 1901: 122, No. 2206; KENNEL, 1921: 683, t. 24 fig. 65 (♂);

diese Arbeit: Taf. 19 Fig. 3 (♂-Genitalien). — Ostrumänien; Mazedonien; Griechenland; Kleinasien.

E. (E.) simploniana (Dup.)*
simploniana DUPONCHEL, 1835, Hist. Nat. Lép. France 9: 259, t. 248 fig. 7 (*Carpocapsa*). — STAUDINGER & REBEL, 1901: 120, No. 2146 (part.); ?KENNEL, 1921: 610, t. 22 fig. 70—72 (♂ ♀); FILIPJEV, 1930*a*: 6, t. 1 fig. 6, t. 2 fig. 2 (Falter, ♂-Genitalien; HANNEMANN, 1961: 142, fig. 287 (♂-Genitalien), t. 15 fig. 16 (Falter). — Skandinavien; Schweiz; Südtirol; Frankreich (Gebirge); ?Österreich; ?Ungarn; ?Schlesien; ?Mazedonien; ?Spanien; ?Polen; ?Ostrußland; ?Alai-Gebirge.

E. (E.) sublimana (H.S.)*
sublimana HERRICH-SCHÄFFER, 1851, Syst. Bearb. Schm. Eur. 4: 242 (*Paedisca*) [1848, Tortr.: t. 31 fig. 229; non bin.]; *?pictana* LAHARPE, 1858, Neue Denkschr. allg. Schweiz. Ges. ges. Naturwiss., Faune Suisse 6: 64 (*Sericoris*); *simploniana* (part.): REBEL, 1901, Stgr.-Rbl. Cat. Lep. Pal. Faun. 2: 120, No. 2146 (*Epiblema*). — FILIPJEV, 1930*a*: 6, t. 1 fig. 5, t. 2 fig. 3, 4 (Falter, ♂-Genitalien); BENANDER, 1950: 133, fig. 12*d* (♂-Genitalien), t. 8 fig. 15 (Vorderflügel). — Norwegen; Alpen Mitteleuropas; ?Nordbayern; Sajan-Gebirge.

E. (E.) expressana (Chr.)
expressana CHRISTOPH, 1881, Bull. Soc. Imp. Nat. Moscou 56 (1): 409 (*Grapholitha*); *contrasignata* CHRISTOPH, 1881, ibid.: 411 (*Grapholitha*); *contrasignana* (lapsus): KENNEL, 1921, Pal. Tortr.: 612, t. 22 fig. 75 (*Epiblema*). — STAUDINGER & REBEL, 1901: 120, No. 2145; KENNEL, 1921: 612, t. 22 fig. 74 (♂). — Südostsibirien (Insel Askold).

E. (E.) acceptana (Snell.)
acceptana SNELLEN, 1883, Tijdschr. v. Ent. 26: 211, t. 12 fig. 9, 9*a* (Kopf, Falter) (*Grapholitha, Paedisca*). — STAUDINGER & REBEL, 1901: 118, No. 2122; KENNEL, 1921: 611, t. 22 fig. 73 (♂). — Amur.

E. (E.) rimosana (Chr.)* (12)
rimosana CHRISTOPH, 1881, Bull. Soc. Imp. Nat. Moscou 56 (1): 407 (*Grapholitha*). — STAUDINGER & REBEL, 1901: 120, No. 2152; KENNEL, 1921: 613, t. 22 fig. 79 (♂); diese Arbeit: Taf. 21 Fig. 1, 2 (♂ ♀-Genitalien). — Amur.

E. (E.) rotundana (Snell.)* (13)
rotundana SNELLEN, 1883, Tijdschr. v. Ent. 26: 209, t. 12 fig. 8, 8a (Kopf, Falter) (*Grapholitha, Paedisca*); [*bimaculosana* CARADJA, 1916, Iris 30: 67 (*Epiblema*); nom. nud.]. — STAUDINGER & REBEL, 1901: 120, No. 2151; KENNEL, 1921: 613, t. 22 fig. 76—78 (♂ ♀); diese Arbeit: Taf. 21 Fig. 3, Taf. 22 Fig. 1 (♂-Genitalien). — Ost- und Südostsibirien.

Species incertae sedis

E. absconditana (Lah.)
absconditana LAHARPE, 1860, Bull. Soc. Vaudoise Sci. Nat. 6: 392 (*Paedisca*). — STAUDINGER & REBEL, 1901: 117, No. 2104. — Sizilien; ?Südfrankreich.

E. albohamulana (Rbl.)
albohamulana REBEL, 1893, Stett. Ent. Ztg. 54: 41 (*Paedisca*). — STAUDINGER & REBEL, 1901: 117, No. 2100; KENNEL, 1921: 594, t. 22 fig. 36 (♂). — Kaukasus.

E. berolinensis Ams.
berolinensis AMSEL, 1932, Dtsche Ent. Zschr.: 18, t. 1 fig. 5 (*Epiblema*). — Deutschland (Berlin).

E. fiorii Trti.
fiorii Turati, 1922, Atti Soc. Ital. Sci. Nat. 61: 172, fig. (*Epiblema*). — Kyrenaika.

E. infuscatana Kenn.
infuscatana Kennel, 1901, Iris 13 (1900): 292 (*Epiblema*). — Staudinger & Rebel, 1901: 263, No. 2100*bis*; Kennel, 1921: 594, t. 22 fig. 35 (♀). — Transkaukasien.

E. micropterana Trti.
micropterana Turati, 1930, Atti Soc. Ital. Sci. Nat. 69: 77, fig. (*Epiblema*). — Kyrenaika.

E. ravana Kenn.
ravana Kennel, 1900, Iris 13: 151, t. fig. 27 (*Epiblema*). — Staudinger & Rebel, 1901: 263, No. 2096*bis*; Kennel, 1921: 594, t. 22 fig. 37 (♂). — Südural.

E. subrigidana Car.
subrigidana Caradja, 1916, Iris 30: 66 (*Epiblema*). — Südostsibirien (Kasakewitsch).

Sg. Cacochroea Ld., 1859

E. (C.) turbidana (Tr.)*
turbidana Treitschke, 1835, Schm. Eur. 10 (3): 98, 255 (*Paedisca*); *zelleriana* Schläger, 1848, Ber. lepid. Tauschver. Jena: 230 (*Paedisca*); *pedana* [?Scopoli, 1763, Ent. Carniol.: 237, fig. 597 (*Phalaena*)]: Werneburg, 1858, Stett. Ent. Ztg. 19: 154 (*Tortrix*); *turbitana* (err. typogr.): Franz, 1943, Denkschr. Akad. Wiss. Wien (Math.-nat. Kl.) 107: 195 (*Epiblema*). — Staudinger & Rebel, 1901: 120, No. 2153; Kennel, 1921: 614, t. 23 fig. 2 (♂); Pierce & Metcalfe, 1922: 70, t. 23 (♂ ♀-Genitalien); Toll, 1958: 76, fig. 15, 16 (♂ ♀-Vorderflügel), t. 5 fig. 18, 20 (♂ ♀-Genitalien); Swatschek, 1958: 150, fig. 166, 167 (Larvalmorphologie); Hannemann, 1961: 142, fig. 286 (♂-Genitalien), t. 15 fig. 21 (Falter). — England; Mitteleuropa; Ungarn; Südostfrankreich; Bulgarien; Albanien; Polen; Ukraine; Kleinasien.

E. (C.) petasitis Toll*
petasitis Toll, 1958, Ann. Zool. Polsk. Akad. Nauk. 17: 75, fig. 11, 12 (♂ ♀-Vorderflügel), t. 4 fig. 14, 16 (♂ ♀-Genitalien) (*Epiblema*). — Hannemann, 1961: 144 nota, 220 fig. (♂-Genitalien). — Polen; Karnische und Bayerische Alpen.

E. (C.) grandaevana (Z.)*
grandaevana Zeller, 1846, Isis: 238 (*Paedisca*); *tussilaginana* Herrich-Schäffer, 1851, Syst. Bearb. Schm. Eur. 4: 205 (*Euchromia*) [1848, Tortr.: t. 33 fig. 240; non bin.]; *cana* [?Scopoli, 1763, Ent. Carn.: 236, fig. 596 (*Phalaena*)] : Zeller, 1868, Stett. Ent. Ztg. 29: 132 (*Phalaena*); *laetulana* Krulikovskij, 1909, Mater. pozn. fauny i flory Ross. Imp. 9: 214 (*Epiblema*). — Staudinger & Rebel, 1901: 115, No. 2067; Kennel, 1921: 548, t. 21 fig. 1, 2 (♂ ♀); Pierce & Metcalfe, 1922: 69, t. 23 (♂ ♀-Genitalien); Benander, 1950: 131, fig. 12*a* (♂-Genitalien), t. 8 fig. 13 (Vorderflügel); Toll, 1958: 75, fig. 13, 14 (♂ ♀-Vorderflügel), t. fig. 15, 17 (♂ ♀-Genitalien); Swatschek, 1958: 150, fig. 168, 169 (Larvalmorphologie); Hannemann, 1961: 144, fig. 292—292*b* (Kopf, Geäder, ♂-Genitalien), t. 11 fig. 13 (Falter); diese Arbeit: Abb. 184, 185 (Kopf, Geäder), 188 (♂-Genitalien). — England; Nord- und Mitteleuropa; Südostfrankreich; Krain; Transsylvanien; Ostbaltikum; Polen; Ukraine; Ostrußland.

Sg. Notocelia Hb., 1825

E. (N.) autolitha (Meyr.) comb. nova*
autolitha Meyrick, 1931, Exot. Micr. 4: 145 (*Eucosma*). — Issiki, 1957: 61, t. 9 fig. 285 (♂); Clarke, 1958: 348, t. 173 fig. 1, 1a (Falter, ♂-Genitalien); Okano, 1959: 260, t. 174 fig. 32 (♀). — Japan.

E. (N.) cynosbatella (L.) comb. nova*
cynosbatella LINNÉ, 1758, Syst. Nat. ed. 10: 536 (*Phalaena Tinea*); *cynosbana* FABRICIUS, 1775, Syst. Ent.: 654 (*Pyralis*); *tripunctana* SCHIFFERMILLER & DENIS, 1776, Syst. Verz. Schm. Wien. Geg.: 131 (*Phalaena Tortrix*); *ocellana* (non Schiff.): HÜBNER, 1796—1799, Samml. eur. Schm., Tortr.: t. 4 fig. 18 (non bin.); *tripunctanum* MEYER, 1909, KRANCHERS Ent. Jahrb. 18: 148 (*Epiblema*); *tripunctata* (laps.): PALM, 1947, Opusc. Ent. 12: 46 (*Epiblema*). — STAUDINGER & REBEL, 1901: 119, No. 2138; KENNEL, 1921: 596, t. 22 fig. 40 (♀); PIERCE & METCALFE, 1922: 67, t. 22 (♂♀-Genitalien) (bei allen vorigen Autoren: als *tripunctana*); BENANDER, 1950: 130, fig. 11*u* (♂-Genitalien), t. 7 fig. 19 (Vorderflügel); SWATSCHEK, 1958: 151 (Larvalmorphologie; als *tripunctana*); HANNEMANN, 1961: 144, fig. 293—293*b* (Kopf, Geäder, ♂-Genitalien), t. 15 fig. 13 (Falter). — Britannien; ganz Europa; Kleinasien; Syrien; Iran; Zentralasien; Sibirien.

E. (N.) tetragonana (Stph.) comb. nova*
tetragonana STEPHENS, [1829, Syst. Cat. Brit. Ins. 2: 174, No. 6911; nom. nud.], 1834, Illustr. Brit. Ent., Haust. 4: 96 (*Spilonota, Epinotia*); *luctuosana* (non Dup.): HERRICH-SCHÄFFER, 1851, Syst. Bearb. Schm. Eur. 4: 242 (*Paedisca*). — STAUDINGER & REBEL, 1901: 115, No. 2065; KENNEL, 1916: 543, t. 20 fig. 60 (♂); PIERCE & METCALFE, 1922: 67, t. 22 (♂♀-Genitalien); HANNEMANN, 1961: 148, fig. 300 (♂-Genitalien), t. 15 fig. 10 (Falter). — Britannien; Mitteleuropa; Frankreich; Schweiz; Nordtirol; Norditalien; Rumänien; Polen; Ostbaltikum.

E. (N.) roborana (Illig.)*
roborana [SCHIFFERMILLER & DENIS, 1776, Syst. Verz. Schm. Wien. Geg.: 131 (*Phalaena Tortrix*); nom. nud.] ILLIGER, 1801, Syst. Verz. Schm. Wien Geg. 2: 67 (*Phalaena Tortrix*); *cynosbana* (non F., 1775): FABRICIUS, 1787, Mant. Ins. 2: 238 (*Pyralis*); *aquana* [HÜBNER, 1796—1799, Samml. eur. Schm., Tortr.: t. 4 fig. 17; non bin.] HAWORTH, 1811, Lep. Brit.: 430 (*Tortrix*); *cynosbatana* HÜBNER, 1825, Verz. bek. Schm.: 380 (*Hedya*). — STAUDINGER & REBEL, 1901: 115, No. 2062; KENNEL, 1916: 541, t. 20 fig. 56, 57 (♂♀); PIERCE & METCALFE, 1922: 67, t. 22 (♂♀-Genitalien); BENANDER, 1950: 123, fig. 11*m* (♂-Genitalien), t. 7 fig. 15 (Vorderflügel); OBRAZTSOV, 1952b: 126, fig. 4*b* (♂-Genitalien); SWATSCHEK, 1958: 153 (Larvalmorphologie); HANNEMANN, 1961: 146, fig. 295 (♂-Genitalien), t. 15 fig. 9 (Falter). — Britannien; Europa (mit Ausnahme von Polargebieten); Kleinasien; Transkaspien; Zentralasien; Sibirien; China.

E. (N.) mediterranea (Obr.)*
mediterranea OBRAZTSOV, 1952, Zschr. Wien. Ent. Ges. 37: 125, fig. 3 (♂-Genitalien) (*Epiblema, Notocelia*). — Mittelitalien; Sizilien.

E. (N.) incarnatana (Zinck.)*
incarnatana [HÜBNER, 1799—1800, Samml. eur. Schm., Tortr.: t. 30 fig. 191; non bin.] ZINCKEN, 1821, CHARPENTIERS Zinsler etc.: 33 (*Tortrix*); *amoenana* HÜBNER, [1814—1817, Samml. eur. Schm., Tortr.: t. 39 fig. 248; non bin.], 1822, Syst.-alph. Verz.: 58 (*Olethreutes*). — STAUDINGER & REBEL, 1901: 115, No. 2063; KENNEL, 1916: 542, t. 20 fig. 58, 59 (♂♀); PIERCE & METCALFE, 1922: 67, t. 22 (♂♀-Genitalien); BENANDER, 1950: 124, fig. 11*l* (♂-Genitalien), t. 7 fig. 18 (Vorderflügel); OBRAZTSOV, 1952b: 126, fig. 4*a* (♂-Genitalien); SWATSCHEK, 1958: 154 (Larvalmorphologie); HANNEMANN, 1961: 146, fig. 296 (♂-Genitalien), t. 15 fig. 5 (Falter). — Britannien; Mittel- und Südeuropa; Skandinavien; Finnland; Dänemark; Belgien; Frankreich; Polen; Ostrußland; Kleinasien; Transkaspien; Zentralasien; Sibirien (südöstlich. einschl.); China.

E. (N.) suffusana (Dup.)*
suffusana DUPONCHEL, 1843, Hist. Nat. Lép. France (Suppl.) 4: 416, t. 83 fig. 10 (*Aspidia*); *trimaculana* (non Don.): HAWORTH, 1811, Lep. Brit.: 442 (*Tortrix*);

?rosaecolana (non Dbld.): OKANO, 1959, Iconogr. Ins. Jap. color. nat. 1: 260, t. 174 fig. 29 (♀) (*Notocelia*). — STAUDINGER & REBEL, 1901: 115, No. 2060; KENNEL, 1916: 540, t. 20 fig. 54 (♂); PIERCE & METCALFE, 1922: 66, t. 22 (♂♀-Genitalien); BENANDER, 1950: 123, fig. 11*n* (♂-Genitalien), t. 7 fig. 16 (Vorderflügel) (als *trimaculana*); SWATSCHEK, 1958: 152, fig. 170, 171 (Larvalmorphologie); HANNEMANN, 1961: 146, fig. 298 (♂-Genitalien). — Britannien; Skandinavien; Dänemark; Belgien; Frankreich; Ostbaltikum; Polen; Ukraine; Ostrußland; Kleinasien; Syrien; Iran; Sibirien; Japan; Nordwestafrika.

E. (N.) rosaecolana (Dbld.)* comb. nova

cynosbana (non F.): DUPONCHEL, 1835, Hist. Nat. Lép. France 9: 178, t. 245 fig. 1 (*Aspidia*); *rosaecolana* DOUBLEDAY, 1850, The Zool. 8 (Appendix): CVI (*Spilonota*); *trimaculana* (part.): STEPHENS, 1852, List Spec. Brit. Anim. 10: 30 (*Spilonota, Hedya*); *suffusana* (part.): LEDERER, 1859, Wien. Ent. Mschr. 3: 335 (*Grapholitha, Paedisca*); *rosaecolona* (err. typogr.): RAGONOT, 1894, Ann. Soc. Ent. France 63: 213 (*Grapholitha*); *rosae* MATSUMURA, 1917, Ôyô Konchûgaku 1: 514 (*Notocelia*); *roseocolana* (laps.): MATSUMURA, 1931, 6000 Illustr. Ins. Jap.: 1073, fig. (*Notocelia*). — STAUDINGER & REBEL, 1901: 115, No. 2061; KENNEL, 1916: 540, t. 20 fig. 55 (♂); PIERCE & METCALFE, 1922: 67, t. 22 (♂♀-Genitalien); ESAKI, 1932: 1461, fig. (Falter); ISSIKI, 1957: 61, t. 9 fig. 278 (♂); SWATSCHEK, 1958: 153 (Larvalmorphologie); HANNEMANN, 1961: 148, fig. 299 (♂-Genitalien), t. 15 fig. 7 (Falter). — Britannien; Dänemark: Jütland; Belgien; Mitteleuropa; Frankreich; Italien; Polen; Ostrußland; Zentralasien; Sibirien (südöstl. einschl.); China; Sachalin; Japan.

E. (N.) uddmanniana (L.)*

uddmanniana LINNÉ, 1758, Syst. Nat. ed. 10: 823 (*Phalaena Tortrix*); *rubiana* SCOPOLI, 1763, Ent. Carn.: 233 (*Phalaena*); *solandriana* (non L.): FABRICIUS, 1775, Syst. Ent.: 648 (*Pyralis*); *udmanniana*: SCHIFFERMILLER & DENIS, 1776, Syst. Verz. Schm. Wien. Geg.: 130 (*Phalaena Tortrix*); *achatana* [HÜBNER, 1796—1799, Samml. eur. Schm., Tortr.: t. 9 fig. 49; non bin.] ILLIGER, 1801, Syst. Verz. Schm. Wien. Geg. 2: 66 (*Tortrix*). — STAUDINGER & REBEL, 1901: 115, No. 2055; KENNEL, 1916: 537, t. 20 fig. 48 (♀); PIERCE & METCALFE, 1922: 66, t. 22 (♂♀-Genitalien); BENANDER, 1950: 122, fig. 10*k* (♂-Genitalien), t. 7 fig. 17 (Falter); SWATSCHEK, 1958: 152 (Larvalmorphologie); HANNEMANN, 1961: 145, fig. 294—294*b* (Kopf, Geäder, ♂-Genitalien); diese Arbeit: Abb. 181—183, 187 (Kopf, Geäder, ♂♀-Genitalien). — Ganz Europa (auch Britannien); Westkaukasus; Kleinasien; Syrien; Libanon; Palästina; Iran; Alai-Gebirge; Transili- und Dschungar-Alatau; Nordwestafrika.

E. (N.) orientana (Car.) comb. & status nov.* (14)

orientana CARADJA, 1916, Iris 30: 64 (*Notocelia*). — KENNEL, 1916: 538, t. 20 fig. 49 (♂); diese Arbeit: Taf. 22 Fig. 2—4 (♂♀-Genitalien). — Kleinasien; Syrien; Alai-Gebirge.

E. (N.) junctana (H.S.)* comb. nova

junctana HERRICH-SCHÄFFER, 1856, Syst. Bearb. Schm. Eur. 6 (Nachtrag): 160 (*Notocelia*). — STAUDINGER & REBEL, 1901: 115, No. 2026; KENNEL, 1916: 538, t. 20 fig. 50 (♀); BENANDER, 1950: 123, fig. 11*o* (♂-Genitalien), t. 7 fig. 20 (Vorderflügel); HANNEMANN, 1961: 146, fig. 297 (♂-Genitalien), t. 12 fig. 2 (Falter). — Schweden; Schlesien; Österreich; Ungarn; Dalmatien; Rumänien; Polen; Ukraine; Ostrußland; Zentralasien; Dschungar-Alatau; Südostsibirien.

E. (N.) jaspidana (Chr.) comb. nova

jaspidana CHRISTOPH, 1872, Horae Soc. Ent. Ross. 9: 12, t. 1 fig. 9 (*Aspis*). — STAUDINGER & REBEL, 1901: 115, No. 2057; KENNEL, 1916: 538, t. 20 fig. 51 (♂). — Ostrußland.

E. (N.) **circumfluxana** (Chr.) comb. nova
circumfluxana CHRISTOPH 1881, Bull. Soc. Imp. Nat. Moscou 16 (1): 78 (*Aspis*). — STAUDINGER & REBEL, 1901: 115, No. 2058; KENNEL, 1916: 539, t. 20 fig. 52 (♀). — Südostsibirien; China; Japan.

E. (N.) **argutana** (Chr.) comb. nova
argutana CHRISTOPH, 1881, Bull. Soc. Imp. Nat. Moscou 16 (1): 79 (*Aspis*). — STAUDINGER & REBEL, 1901: 115, No. 2059; KENNEL, 1916: 539, t. 20 fig. 53 (♀). — Südostsibirien; Japan.

Kommentar zum Katalog der *Epiblema*-Arten

1. *Epiblema* (*Epiblema*) *banghaasi* Kenn. — Holotypus: Männchen (Genitalpräparat No. B. 28), Sutschan, 1890 (DÖRR.); Z.M.B.

2. *E.* (*E.*) *foenella* (L.). — Die Variation des weißen Schrägfleckes der Vorderflügel führte zur Aufstellung zahlreicher Individualformen dieser sonst leicht erkennbaren Art. Bei der namenstypischen Form hat der Fleck einen mäßig langen Außenfortsatz. Wenn dieser Fortsatz bis zur Spiegelstelle erreicht, entsteht die f. *interrogationana* Don. Bisweilen ist der Stiel des Schrägfleckes stark zur Vorderflügelbasis geneigt (f. *accentana* Car.), oder der Fleck ist durch eine Aufhellung der Vorderflügelgrundfarbe schräg mit der Costa-Wurzel verbunden (f. *albrechtella* Meyer). Bei einer gleichmaligen Entwicklung der *accentana*- und *interrogationana*-Merkmale entsteht die f. *clavigerana* Wkr., bei welcher der Vorderflügel von seiner Wurzel bis zur Spiegelstelle durch eine mehr oder weniger wellige Längsbinde durchzogen ist. Diese Formen sind nicht lokal gebunden, aber im Fernen Osten treten sie angeblich häufiger auf, bedingen doch auch dort keine Absonderung als eine eigene Unterart. Die f. *separana* Krul. und f. *unicolorana* Klem. können als Formen mit einer Reduktion des Schrägfleckes genannt werden. Bei der ersteren ist der Schrägfleck in zwei Fleckchen aufgelöst, bei der zweiten ist er vollständig verschwunden. Es sind auch Übergänge bekannt, bei welchen der Fleck nur mehr oder weniger verdüstert ist. Diese melanistischen Formen sollen nicht mit den verölten Exemplaren verwechselt werden, bei welchen der scheinbar fehlende Fleck bei der Entölung wieder erscheint. Noch manche weitere Formen wurden aufgestellt, aber sie stellen nur Übergänge zu den oben aufgezählten Formen dar und können dieser oder jener von ihnen als Synonyme zugezogen werden.

Vom Amur ("Radde") erwähnt CARADJA (1916: 67) ein Männchen, das WALSINGHAM ihm als *Epiblema otiosana* (Clem.) bestimmte. Es ist recht zweifelhaft, ob diese ausgesprochen nordamerikanische Art im Fernen Osten auftritt. Vielleicht handelte es sich nur um ein aberratives *foenella*-Exemplar. Deshalb erwähne ich *otiosana* nicht als eine in der palaearktischen Region auftretende Art, solange ihr Vorhandensein in dieser Fauna von keinem anderen Autor bestätigt ist.

Als von mir untersuchte Typen der Arten, die mit *foenella* konspezifisch sind, können die folgenden zwei genannt werden:

Sciaphila sinicana Walker: Holotypus, Männchen (Hinterleib fehlt), Schanghai; B.M.

Grapholitha clavigerana Walker: Holotypus, Männchen, Schanghai; B.M. Mit der Feststellung, daß diese Form artlich zu *foenella* gehört, ist die Angabe von *clavigerana* in Tijdschr. v. Ent. 102 (Seite 192) zu streichen.

3. *E.* (*E.*) *inconspicua* (Wlsm.). — Lectotypus: Männchen (Genitalpräparat No. 5363), Tsuruga, Hondo, Japan, Juli 1886 (LEECH; WLSM. No. 60122). Lectoallotypus: Weibchen, gleiche Angaben (WLSM. No. 60125). Lectoparatypen: 1 Männchen (Genitalpräparat No. 6844), gleiche Angaben (WLSM. No. 60129); 1 Weibchen (Genitalpräparat No. 6845), Japan, 1886 (PRYER; WLSM. No. 70026). Alle erwähnten Typen befinden sich im B.M.

4. *E.* (*E.*) *denigratana* Kenn. — Holotypus: Männchen (Genitalpräparat von V. KUZNETZOV angefertigt), Sutschan; Z.M.B.

5. *E.* (*E.*) *farfarae* (Fletch.). — Längere Zeit war für diese Art der Name *brunnichiana* Fröl. (1828) gebraucht, aber FLETCHER (1938) zeigte, daß seine Verwendung auf eine falsche Deutung des Artnamens *brunnichana* L. (1767) gründete, und schlug *farfarae* als einen Ersatznamen vor. FLETCHER meinte, daß die Endungsdifferenz zwischen *-iana* und *-ana* nicht genügen um die beiden Namen (*brunnichiana* und *brunnichana*) nomenklatorisch zu rechtfertigen. Dies stimmt nicht mit den neuen Nomenklaturregeln überein (cf. International Code, 1961, 1964: Artikel 57*c*), da "the difference of a single letter is sufficient to prevent homonymy". Wichtiger und entscheidender ist die Tatsache, daß der Artname *brunnichiana* nicht von FRÖLICH (1828), sondern von SCHIFFERMILLER & DENIS (1776) zuerst eingeführt wurde und diese Autoren LINNé als den Originalautor des Artnamens zitierten. Es ist deshalb klar, daß SCHIFFERMILLER & DENIS die LINNésche Schreibweise des Namens entweder absichtlich oder versehentlich änderten. Ob sie dabei mit diesem Namen *brunnichana* L. oder eine andere Art bezeichnen wollten, kann nicht festgestellt werden, da bereits im Jahre 1784 FABRICIUS bei seiner Revision der SCHIFFERMILLERschen Sammlung keinen Falter unter diesem Namen fand. Damit gibt es keine Auswahl, als die SCHIFFERMILLERsche *brunnichiana* auf die LINNésche *brunnichana,* die eine *Epinotia*-Art ist, zu beziehen oder gar zu ignorieren. Dem von HÜBNER (1825) für die jetzt als *farfarae* bekannte Art eingeführten Namen *brunichiana* kann man auch keine nomenklatorisch berechtigte Priorität zuschreiben, da bei der Aufstellung dieses Namens HÜBNER sich auf SCHIFFERMILLER & DENIS bezog und deshalb keinen neuen Artnamen schuf.

Bei dieser Gelegenheit soll noch erwähnt werden, daß der Artname *farfarae* durch *sticticana* F. (1794) vielleicht vorgegriffen wurde. Der *sticticana*-Typus ist leider nicht untersucht worden und die vermutlich gemeinsame artliche Zusammengehörigkeit dieser Art und *farfarae* beruht ausschließlich auf eigenen Spekulationen von WERNEBURG (1864, 1: 465, 554) und ist deshalb nicht überzeugend. Falls die Ausführungen dieses Autors bestätigt werden, sogar dann wird eine Wiederherstellung des Namens *sticticana* und seine Verwendung anstatt von *farfarae* kaum erwünscht sein, da *sticticana* ein wirkliches „nomen oblitum" ist und mehr als 100 Jahre nicht gebraucht wurde.

6. *E.* (*E.*) *obscurana* (H.S.). — Diesen Artnamen ersetzte MEYRICK (1932) durch *inulivora,* als er *obscurana* H.S. und *obscurana* Stph. in ein und dieselbe Gattung stellte. Da *obscurana* Stph. eine *Pammene*-Art ist (vgl. OBRAZTSOV, 1960: 117) und *obscurana* H.S. zu *Epiblema* gehört, besteht keine sekundäre Homonymie zwischen diesen beiden Arten und der Name *inulivora* Meyr. muß zurücktreten (vgl. International Code, 1961, 1964: Artikel 53).[1]

7. *E.* (*E.*) *asseclana* (Hb.). — In seiner Übersicht der deutschen Tortriciden verwendete HANNEMANN (1961) für diese Art den älteren Namen *similana* Schiff., wie ich dieses ihm brieflich empfohlen habe. Leider geschah das fast gleichzeitig mit der Veröffentlichung der neuen Nomenklaturregeln (International Code, 1961, 1964: Artikel 23*b*), die deshalb nicht berücksichtigt werden konnten. Im Einklang mit dem erwähnten Artikel sind die mehr als 50 Jahre nicht gebrauchten älteren Synonyme als "nomina oblita" zu behandeln. Nur im Fall, wenn der Gebrauch von solchen vergessenen Namen im Interesse der Nomenklaturstabilität und -universalität erforderlich ist, kann ein solcher Name durch Erlaß der Internationalen Nomenklaturkommission genehmigt werden. Da gegebenenfalls die Wiederherstellung des Artnamens *similana* keine Vorzüge für die Nomenklatur mit sich bringt, scheint es ganz praktisch zu sein, für die hier in Frage stehende Art ihren eingebürgerten Namen *asseclana* zu erhalten.

Trotzdem ist es wichtig die Ursachen zu erwähnen, aus welchen der Name *similana* Schiff. auf *asseclana* Hb. und nicht, wie gewöhnlich gemeint, auf *Epinotia stroemiana* (F.) bezogen werden soll. Wie die meisten von SCHIFFERMILLER & DENIS veröffentlichten Urbeschreibungen, ist auch die der *similana* ganz kurz und wenig ausdrücklich: "Grauer W.[ickler] mit 2. weisslichten Flächen und gestrichtem Aussenrande." ILLIGER (1801: 66) war geneigt, in dieser Beschreibung *similana* Fig. 41 von HÜBNER (1796—1799) zu erkennen, welche mit

[1] Der Artikel 59*c* desselben Kodes ist etwas verwirrend, da er nur von der Wiederherstellung der nach 1960 widerrufenen sekundären Homonyme spricht und indirect die vor diesem Datum widerrufenen Artnamen unwiederherstellbar macht.

Epinotia stroemiana (F.) identisch ist. CHARPENTIER (1821: 87), der die SCHIFFERMILLERsche Sammlung sorgfältig revidierte, schrieb aber von *similana* Schiff. wie folgt: „Auch ich hätte mit ILLIGER nach den Worten des W.V. [d.h., Wiener Verzeichnisses] hier die *Similana* Hüb. Fig. 41 für die hier zu allegierende gehalten. Jedoch es war hier in der Sammlung eine sehr schön conservierte, etwas bräunliche Abänderung der *Asseclana* Hüb. Fig. 19 (nicht 194) befindlich. Auf diese passen die Worte des W.V. wohl auch. Doch bleibt mir die Sache noch etwas zweifelhaft, da die *Asseclana* Hüb. Fig. 19. in der Sammlung schon einmal als *Scutulana* vorkam." In einer Fußnote zum oben zitierten Absatz, äußerte sich ZINCKEN in demselben Werke: „HÜBNERS *Tortr. similana* Fig. 41. ist nicht, wie LASPEYRES will, Abänderung von *Profundana* Hübn. [= *Eudemis profundana*], sondern wesentlich verschiedene und durchaus eigene Art. Die *T. similana* S.V. [d.h., Systematisches Verzeichniss] ist aber Abänderung von *T. profundana* S.V. und die Meinung unsers Verfassers [CHARPENTIER], der hier eine *Asseclana* Hübn. Fig. 19 in der SCHIFFERMILLERschen Sammlung gefunden haben will, wird dadurch bestätigt, daß die Theresianer [d.h., SCHIFFERMILLER & DENIS] ihrer *Similana* einen gestrichten Aussenrand zueignen, den nur jene Wickler haben, nie aber an HÜBNERS *Similana* vorkommt." Wie aus dem vorigen hervorgeht, waren die beiden ersten Revisoren der SCHIFFERMILLERschen Sammlung in ihrem Urteil über *similana* Schiff. einig und erkannten in dieser *asseclana* Hb., Fig. 19.

Auch HÜBNER (1825: 377) hat in seiner *asseclana* die *similana* Schiff. erkannt, obwohl er früher (HÜBNER, 1822: 65) diesen letzteren Namen auf seine gleichnamige Art „Fig. 41" bezog. In der Identität der *asseclana* Hb. und *similana* Schiff. waren auch TREITSCHKE (1835: 100—102), FISCHER v. RÖSLERSTAMM (1840: 174) und HEINEMANN (1863: 155) überzeugt, was aus der von diesen Autoren angegebenen Synonymie und den Beschreibungen zu ersehen ist. In seinem Bericht über die Revision der SCHIFFERMILLERschen Sammlung durch FISCHER v. RÖSLERSTAMM schrieb HERRICH-SCHÄFFER (1851: 235—236) von *similana* Schiff.: „Das erste große, gute Stück ist ein Mann, wozu *Fluidana* S.V. (N. 20—21) das Weib ist. Nur hierher kann *Asseclana* Hbn. 19 gezogen werden, welche auch HÜBNER selbst im V. b. Schm. N. 3622 für *Similana* S.V. erklärt. CHARP. hält sie auch, jedoch mit einigen Bedenken, für *Asseclana* FR. 19 [Druckfehler für „Hb."], es scheint aber, daß er damit das zweite Stück meint, weil er von einer bräunlicher Abänderung spricht. — Das zweite, ebenfalls gute Stück ist *Poedisc. Hepaticana* Tr. — CHARP. und TREITSCHKE ziehen *Scutulana, Similana* u. *Fluidana* zusammen; TREITSCHKE trennt aber im 10. Bande *Similana,* und übersah, daß *Fluidana* das Weib von *Similana* (dem ersten Stücke) ist, so wie auch, daß das zweite Stück seine im 10. Bande als eine neue Art beschriebene *Hepaticana* ist. Die Diagnose der Theresianer läßt sich nur auf das erste Stück (*Asseclana* H.) anwenden." Das Gesagte zeigt ganz eindeutig, daß es nichts hindert, in *similana* Schiff. ein älteres Synonym von *asseclana* Hb. anzuerkennen. Hierher gehört auch *fluidana* Schiff. als ein zweiältestes Synonym.

8. *E.* (*E.*) *cretana* Osth. — Holotypus: Weibchen (Genitalpräparat No. M. 1047), Wald Rouwa, Berg Ida, Kreta, 1300 m, 2.VII.1938 (H. DÜRCK); Z.S.M. Die Genitalien dieser Art und *scutulana* Schiff. sind recht verschieden.

9. *E.* (*E.*) *angulatana* Kenn. — Lectotypus: Männchen (Genitalpräparat No. B. 35), Sutschan, 1890 (DÖRR.); Z.M.B.

10. *E.* (*E.*) *pryerana* (Wlsm.). — Holotypus: Weibchen (Genitalpräparat No. 5364), Oiwake, Hondo, Japan, Juli 1887 (PRYER; WLSM. No. 70069); B.M.

11. *E.* (*E.*) *macrorris* (Wlsm.). — Holotypus: Weibchen (Genitalpräparat No. 5747), Japan, 1886 (PRYER; WLSM. No. 70067); B.M.

12. *E.* (*E.*) *rimosana* (Chr.). — Lectotypus: Männchen (Genitalpräparat No. 5-Obr. 1961). Lectoallotypus: Weibchen (Genitalpräparat No. 4-Obr. 1961). Lectoparatypus: 1 Männchen. Alle obigen Exemplare haben „Amur" als die einzige Fundortangabe und befinden sich im Z.M.B. Ein weiteres Männchen in demselben Museum stammt von der Insel Askold, 1883 (DÖRR.). Im Vergleich zu den vorliegenden Exemplaren ist die von KENNEL (1921) ver-

öffentlichte Abbildung etwas zu grell. Da aber auch bei den untersuchten Faltern die Vorderflügelzeichnung und die Grundfärbung leicht variieren und die Vorderflügel nicht bei allen gleich verdunkelt sind, kann man annehmen, daß auch diese Abbildung richtig ist.

13. *E.* (*E.*) *rotundana* (Snell.). — Lectotypus: Männchen (Genitalpräparat No. 2639), Insel Askold, 1878 (D.). Lectoparatypus: 1 Männchen, gleichweise bezettelt. Beide befinden sich im M.L.

14. *E.* (*E.*) (*Notocela*) *orientana* (Car.). — Die ursprünglich als eine *uddmanniana*-Unterart beschriebene *orientana* muß als eine eigene Art anerkannt werden. Äußerlich unterscheidet sie sich von *uddmanniana* durch eine viel hellere, ockerbräunliche Vorderflügelgrundfarbe. Der rostbraune Dorsalfleck ist auch viel heller als bei *uddmanniana* und sein oberer Winkel ist deutlicher zugespitzt. Auch die Hinterflügel sind heller als bei *uddmanniana.* Dasselbe betrifft den Kopf mit seinen Anhängen, Thorax, Hinterleib und Beine. Die männlichen Genitalien unterscheiden sich von solchen der *uddmanniana* durch ein gleichmäßig abgerundetes Tegumenhöckerchen und einen schmäleren und stärker ausgezogenen Analwinkel des Cucullus. In den weiblichen Genitalien fällt eine caudal tiefer ausgeschnittene Ventralplatte auf, sowie ein caudal fast gerades Sterigma, das gleichmäßiger breit als bei *uddmanniana* ist und rings um Ostium bursae drei kleine, nach innen gerichtete Zähnchen aufweist. Der sklerotisierte Gürtel des Ductus bursae ist etwas breiter als bei *uddmanniana.* Die geographische Verbreitung der *orientana* beschränkt sich auf Kleinasien, Syrien und Alai-Gebirge, wo sie anscheinend zusammen mit *uddmanniana* fliegt. Man kann vermuten, daß *orientana* auch in anderen Gebieten Asiens gefunden wird.

1

2

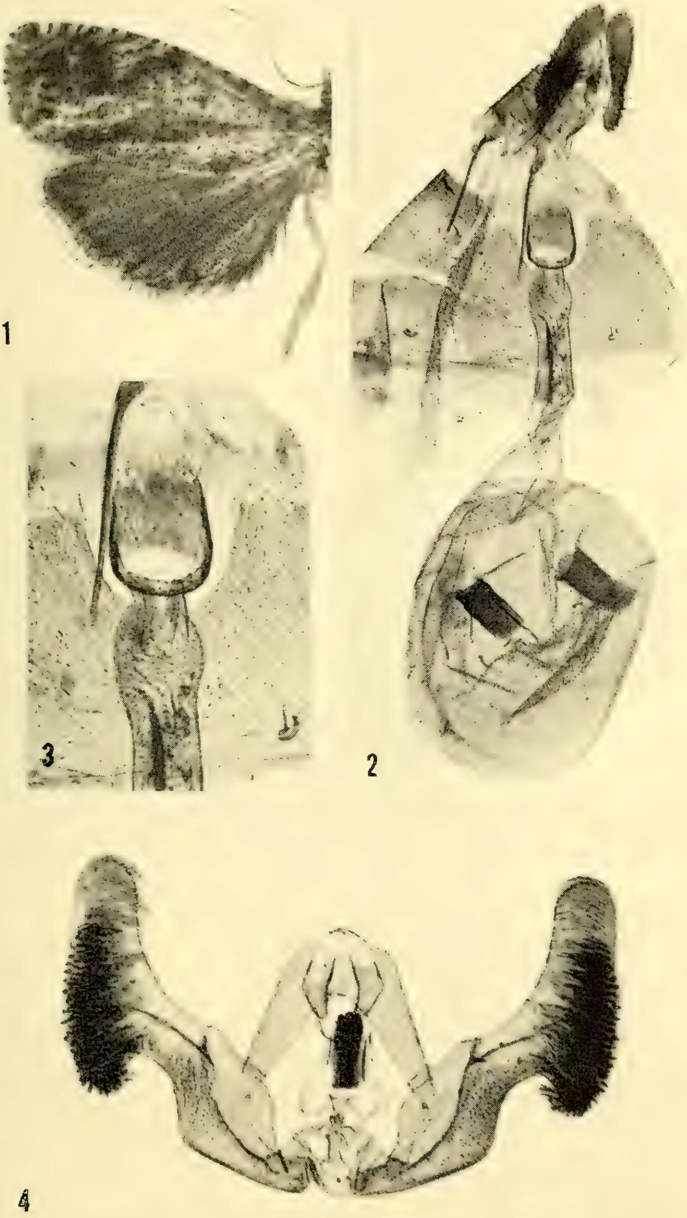
Tafel 16. *Thiodia fessana* (Mn.), Männchen, Holotypus. 1. Falter. 2. Genitalien

1

2

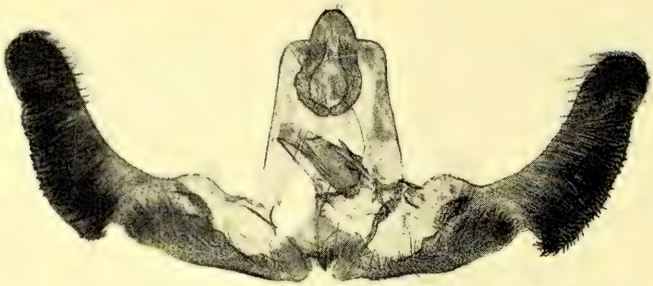
3

Tafel 17. Männliche Genitalien der *Epiblema*-Arten. 1. (*Epiblema*) *banghaasi* Kenn., Holotypus. 2. *E.* (*E.*) *inconspicua* (Wlsm.), Lectotypus. 3. Idem, Lectoparatypus (Genitalpräparat No. 6844), Tsuruga, Japan, Juli 1886 (Leech; 60129); B.M.



Tafel 18. *Epiblema*-Arten. 1. *E.* (*Epiblema*) *inconspicua* (Wlsm.), Lectoparatypus, Männchen (Genitalpräparat No. 6844), Tsuruga, Japan, Juli 1886 (Leech; 60129); B.M. 2. Idem, weibliche Genitalien eines Lectoparatypus (Präparat No. 6845), Japan, 1886 (Pryer; 70026); B.M. 3. Idem, Gebiet des Ostium bursae. 4. *E.* (*E.*) *denigratana* Kenn., Holotypus, männliche Genitalien

N. S. Obraztsov : *Die Gattungen der palaearktischen Tortricidae*



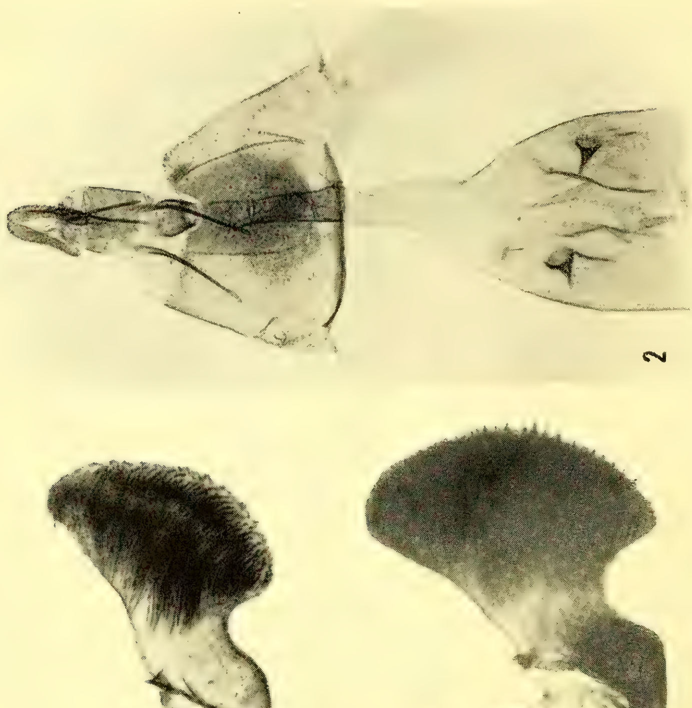
1

2

3

Tafel 19. Männliche Genitalien der *Epiblema*-Arten. 1. *E.* (*Epiblema*) *angulatana* Kenn., Lectotypus. 2. *E.* (*E.*) *pryerana* (Wlsm.), Nikko, Provinz Shimotsuke, Honshu, Japan, 2000 ft., 24. Mai 1896 (A. E. Wileman; Genitalpräparat No. 6849); B.M. 3. *E.* (*E.*) *gammana* (Mn.), Boli, Bithynien, 800 m, 11.—20. Juni 1934 (E. Pfeiffer; Genitalpräparat No. 1-Obr. 8/28 58); Z.S.M.

Tafel 20. Weibchen der *Epiblema*-Arten. 1. *E.* (*Epiblema*) *cretana* Osth., Holotypus. 2. *E.* (*E.*) *pryerana* (Wlsm.), Holotypus, Genitalien. 3. *E.* (*E.*) *macrorris* (Wlsm.), Holotypus. 4. Idem, Genitalien



Tafel 21. Genitalien der *Epiblema*-Arten. 1. *E.* (*Epiblema*) *rimosana* (Chr.), Männchen, Lectotypus. 2. Idem, Weibchen, Lectoallotypus. 3. *E.* (*E.*) *rotundana* (Snell.), Männchen, Lectotypus

Tafel 22. Genitalien der *Epiblema*-Arten. 1. (*Epiblema*) *rotundana* (Snell.), Weibchen (Genitalpräparat No. M. 442), Amur; Z.S.M. 2. *E.* (*Notocelia*) *orientana* (Car.), Männchen (Genitalpräparat No. 7-Obr. 7/13 1960), Marasch, Nordsyrien, 1200 m, 28. Mai 1928; Z.S.M. 3. Idem, Weibchen (Genitalpräparat No. 8-Obr. 7/13 1960), Marasch, Achtyr Dagh, Nordsyrien, Juni 1931; Z.S.M. 4. Idem, Gebiet des Ostium bursae

NIPPODYSAPHIS NOM. NOV. FOR NEODYSAPHIS HILLE RIS LAMBERS, 1965

BY

D. HILLE RIS LAMBERS

Bladluisonderzoek T.N.O., Bennekom, Netherlands

In this volume, p. 191, I have described *Neodysaphis* gen. nov., type-species *Neodysaphis deutziae* spec. nov. Dr. H. L. G. STROYAN, Harpenden, England, kindly pointed out to me that the generic name is preoccupied by *Neodysaphis* Narzykulov, 1961, type-species *Dysaphis pseudomolli* Narzykulov, 1961, erected as a subgenus to *Dysaphis* Börner (NARZYKULOV, M. N., 1961, O novych i maloizvestnych vidach tlei roda *Dysaphis* Börner (Homoptera, Aphididae) iz Tadzhikstana. Trudy instituta zoologii i parasitologii E. N. Pavlovskogo AN Tadzhikskoi SSR 20: 82.).

As a new name for *Neodysaphis* Hille Ris Lambers, 1965, I propose **Nippodysaphis** nom. nov.

REGISTER VAN DEEL 108

* Een sterretje duidt een naam aan nieuw voor de wetenschap.
* One asterisc denotes a name new to science.

From this Index are omitted names of taxa lower than subspecies.

LEPIDOPTERA

ODONATA

RHYNCHOTA

PLANTAE

ERRATA

Page 220, for line 14 from bottom substitute:
— *b.* Hind angles of the pronotum with a minute tooth in *T. obtusus :* REIT-
p. 237, line 15 from bottom, for *abtusiodes* read *obtusioides.*

Tijdschrift voor Entomologie

Het verschijnt in één deel van 350—450 bladzijden per jaar, bestaande uit enkele afleveringen.

Entomologische Berichten

Deze zijn bestemd voor de publicatie van kortere artikelen, faunistische notities etc., alsmede van de Verslagen der Vergaderingen en van mededelingen van het bestuur. Zij verschijnen twaalf maal per jaar in een aflevering van 16 of meer bladzijden, die samen een deel vormen.

Trichopterorum Catalogus

Deze Catalogus van F. C. J. Fischer wordt door de Vereeniging voor rekening van de auteur uitgegeven. Alle bekende recente en fossiele soorten van de gehele wereld met hun synoniemen worden er in behandeld. Delen I en II kosten f 39.— per stuk, delen III—V: f 45.—. Er zullen in totaal 15 delen verschijnen. Van alle delen zijn ook éénzijdig bedrukte exemplaren beschikbaar. De prijsverhoging hiervoor bedraagt f 2.50.

Entomologia Experimentalis et Applicata

Dit tijdschrift wordt uitgegeven door de Noord-Hollandse Uitgevers Maatschappij te Amsterdam in opdracht van de Vereeniging. Het publiceert artikelen over experimentele biologie en oekologie bij insecten en andere land-arthropoden. Het verschijnt vier maal per jaar en bevat 320 bladzijden. De prijs voor leden bedraagt f 25.—, voor niet-leden f 40.— per jaar.

Alle zakelijke correspondentie betreffende de Vereeniging te richten aan de Secretaris, W. Hellinga, Weesperzijde 23II, Amsterdam-O.

Alle correspondentie over de redactie van het Tijdschrift voor Entomologie en de Monographieën te richten aan de Redacteur, Dr. A. Diakonoff, Rijksmuseum van Natuurlijke Historie, Leiden.

Alle correspondentie over de redactie van de Entomologische Berichten te richten aan de Redacteur, B. J. Lempke, Oude IJselstraat 12III, Amsterdam-Z. 2.

Alle correspondentie over de redactie van Entomologia Experimentalis et Applicata te richten aan de Redacteur, Dr. P. A. van der Laan, Lab. voor Toegepaste Entomologie, Linnaeusstraat 2 B, Amsterdam.

Alle betalingen te richten aan de Penningmeester, Drs. H. Wiering, Doorntjes 29, Bergen (N.H.), postgiro 188130, ten name van de Nederlandsche Entomologische Vereeniging te Bergen (N.H.).

Alle correspondentie betreffende de Bibliotheek der Vereeniging te richten aan de Bibliotheek, Zeeburgerdijk 21, Amsterdam-O.

Notice to Subscribers

All correspondence referring to subscriptions and exchange of the periodicals of the Netherlands Entomological Society should be addressed to the Librarian, Zeeburgerdijk 21, Amsterdam-O, Netherlands.

NOTICE TO CONTRIBUTORS

Contributors will receive free of charge fifty reprints of their papers, joint authors have to divide this number between them at their discretion. Additional reprints may be ordered when returning proofs.

Manuscripts should be written in Dutch, English, French, German or Italian. If they contain descriptions of new genera, species, etc., they should be in one of the four last mentioned languages.

The author should communicate with the editor before submitting his manuscript. He will enclose with manuscript a Synopsis (Abstract), styled according to recommendations of the UNESCO (style rules will be provided by the editor) and, if needed, a Summary. Papers in Dutch should contain an Abstract and/or a Summary in one of the four other languages.

Manuscripts should be typewritten in double spacing on only one side of the paper, with a margin of at least three cm at the left side of each sheet. Paragraphs should be indented. Carbon copies cannot be accepted, as handling makes them illegible.

Captions for text figures and plates should be written on a separate sheet in double spacing, numbered consecutively in arabic numerals; the use of a, b, c, or any other subdivision of the figure numbering should be avoided.

Drawings for reproduction should be on good paper in Indian ink, preferably at least one and a half times as large as the ultimate size desired. Lettering should be uniform, and, after reduction, of the same size. Photographs should be furnished as shiny positive prints, unmounted. Plates should be arranged so as to fill a whole page (11.5 x 19 cm) of the *Tijdschrift.* or a portion thereof, captions included. Combinations of illustrations into groups are preferable to separate illustrations, since there is a minimum charge per block.

Names of genera and lower systematic categories, new terms and the like are to be underlined by the author in the manuscript by a single straight line. Any other directions as to size or style of the type are given by the editors, not by the author. Italic type or spacing to stress ordinary words or sentences is to be avoided. Dates should be spelled as follows: either "10.V.1948" or "10 May, 1948". Other use of latin numerals should be avoided, as well as abbreviations in the text, save those generally accepted. Numbers from one to ten occurring in the text should be written in full, one, two, three, etc. Titles must be kept short. Footnotes should be kept at a minimum.

Bibliography should not be given in footnotes but compiled in a list at end of the paper, styled as follows:

Mosley, M. E., 1932, "A revision of the European species of the genus *Leuctra* (Plecoptera)". — Ann. Mag. Nat. Hist. [10] 10 (3): 1—41, pl. 1—5, fig. 1—57. Number of issue should only be added (in parentheses) when it has individual pagination.

Text references to this list might be made thus:
"Mosley (1932) says...." or "(Mosley, 1932)".

The editors reserve the right to adjust style to certain standards of uniformity.

Manuscripts and all communications concerning editorial matters only should be sent to: Dr. A. Diakonoff, Rijksmuseum van Natuurlijke Historie, Leiden, The Netherlands.

Date Due